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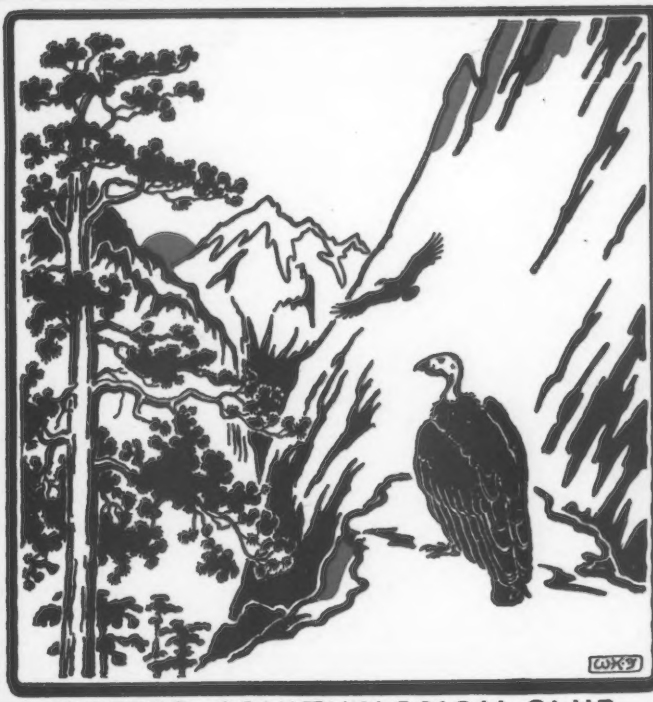
THE CONDOR

A Magazine of Western Ornithology

Volume XL September-October, 1938 Number 5



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THE CONDOR

A Magazine of Western Ornithology

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THE CONDOR

VOLUME XL SEPTEMBER-OCTOBER, 1938 NUMBER 5

THE TEXAS NIGHTHAWK IN ITS SUMMER HOME

WITH FOURTEEN ILLUSTRATIONS

By GAYLE PICKWELL and EMILY SMITH

INTRODUCTION

A spur of the Santa Cruz Mountains extends toward the Mount Hamilton Mountains ten miles south of the city of San Jose, California, to restrict the level portion of the Santa Clara Valley to a trough less than a mile wide. Through this restricted area, the Lower Gorge, the Coyote River has its channel. Through most of the year the Coyote channels are dry and surfaced with stream gravel. On these gravel surfaces, Texas Nighthawks (*Chordeiles acutipennis texensis*) were seen by the writers for the first time on May 22, 1929, and on this date the first nest was found. This was the initiation of an intensive study of this striking bird, a study that extended over several years.

Within the past few years this area has been utilized as a percolation basin as a part of the water conservation program of the Santa Clara Valley. This necessarily has made untenable for the nighthawks much of the area covered by these studies.

The area wherein the nighthawks bred was called to the attention of the writers by Dr. Charles Piper Smith of San Jose. He accompanied us on our first journey and was present at the finding of our first nest. Many other individuals have served as companions or assistants in searching for nests or young. One of these was Dr. Alton Alderman, now of Eugene, Oregon. Miss Mary Morgan Smith accompanied Miss Emily Smith on some of her visits in the evening and very early morning. Miss Yvonne Champreux was a companion to Miss Smith during the observations that lasted through the night. Mr. Tom Rodgers frequently accompanied Pickwell; also he made the map (fig. 46) which accompanies this article.

In furtherance of the study of the Texas Nighthawk, 51 visits were made to the territory in 1929, 12 in 1930, 8 in 1931, 4 in 1932, 4 in 1933, and 3 in 1936, a total of 83 visits. On some of these occasions both of the writers were present, but usually they were working independently and this paper is a combination of the work and study of both.

THE BIRD

The Foraging Nighthawk.—The Texas Nighthawk, a typical goatsucker, seems to live exclusively on insects, for which it forages in the air. Nighthawks were observed foraging on one of our evening visits to the nesting territory. The following record taken from the notes of July 8, 1930, will be indicative of the general behavior. The first nighthawk was seen at 7:16 p.m., apparently a female. The sun had not yet set. Four nighthawks were observed in the air at 7:25. Swallows were still in voice. The sun set at 7:31. These foraging nighthawks were flying rather high, at a maximum height of about 100 feet. At 7:37 a male came to the vicinity of the young, apparently supplied with food.

Migration.—We do not have enough records to give extensive data on migration. However, we have a record of a Texas Nighthawk on the breeding grounds on April 10, 1931, and a late record on September 13, 1929, when an adult and juvenile were noted.

Molt.—On July 9, 1929, a male was noted with some central primaries missing, and the female of this pair had ragged tail and wings. The nighthawks in general were at this time still in breeding activity and this pair was still feeding young.

Eyeshine.—On one or two occasions our records show that red eyeshine was noted in both male and female birds. For instance, on July 18, 1929, at 8:25 p.m. at nest 4, both the sexes showed this eyeshine when a flashlight was directed upon them. This character of eyeshine becomes of some interest when it is noted that van Rossem (1927, p. 28) describes the eyeshine of these birds in their winter home in January and February, in El Salvador, as a pale green. He also recounts in this publication that Mr. Laurence Huey had told him of the red eyeshine of these birds in spring and summer months. Van Rossem then suggests that the change of eye color may be related to sexual activity.

THE BREEDING AREA

The Santa Clara Valley has been known as a breeding area of the Texas Nighthawk for some time, for Unglish (1929, p. 223) records the presence of eight or ten pairs of

Fig. 45. Breeding ground of Texas Nighthawk. Gravel bed of Coyote River in region of Lower Gorge, near San Jose, California.

nighthawks on Uvas Creek in the vicinity of Gilroy in 1894 and reports eggs taken in 1922, 1923, and 1929; he also reports eggs taken on the Coyote River near Coyote (the location of this study) in 1925.

As figure 46 shows, the breeding area covered by this study was restricted to the gravel beds of the Coyote River, and extended northward from the narrowest portion of the Lower Gorge for a distance of not over half a mile along the course of the river. Careful study was not made of other regions of the valley where the Texas Nighthawk might also nest, but the region under consideration was worked very carefully.

Flora and Life-zone.—Grinnell (1915, p. 85) says of this bird, "Common summer visitant to Lower Sonoran practically wherever this zone occurs." Hall and Grinnell (1919, p. 49) list the Texas Nighthawk as an indicator of the Lower Sonoran Life-zone and the A. O. U. Check-list (1931, p. 177) also states that this bird occurs in the Lower Austral Zone. However, it is to be noted that the Santa Clara Valley, where this study was made, is in the Upper Sonoran Zone (see Grinnell, 1935). A careful study of the

flora of the gravel beds was made and it was found that *Lepidospartum squamatum* occurred there. Hall and Grinnell listed this as a Lower Sonoran indicator, noting that it is closely restricted to this zone and particularly characteristic of it. This would seem to show that the region occupied by the Texas Nighthawk represents a Lower Sonoran island surrounded by typical Upper Sonoran conditions.

FLORA OF GRAVELLY FLOOD BEDS

Abundant plants
- *Baccharis viminea*
- *Chrysopsis oregana*
- *Senecio douglasii*
- *Mentzelia laevicaulis*
- *Brickellia californica*
- *Brassica adpressa*

Scattered plants
- *Lepidospartum squamatum*
- *Datura stramonium*
- *Heliotropium curassavicum*
- *Verbascum thapsus*
- *Xanthium canadense*
- *Amaranthus blitoides*
- *Chenopodium botrys*
- *Centaurea melitensis*
- *Artemisia vulgaris* var. *heterophylla*
- *Eremocarpus setigerus*
- *Antirrhinum glandulosum*
- *Antirrhinum vagans*
- *Salix melanopsis*
- *Salix laevigata*

Bird Associates.—Careful records of other birds were maintained on many of the visits to the home of the Texas Nighthawk. A table follows, but one or two items of more than passing interest will be mentioned here.

On two or three occasions while experimenting with the Texas Nighthawk, the flushing bird created considerable excitement among Cliff Swallows which were foraging over the region, for they flew back and forth crying in alarm upon the appearance of the female nighthawk. Also, an Arkansas Kingbird, watching for insects on a nearby clump of *Baccharis viminea*, became excited and remained so for several minutes, flying back and forth over a point where the nighthawk had disappeared.

This reaction of these passerine birds to the nighthawk, so similar to the reaction of these same birds to an owl, came about perhaps because of the similarity in plumage. In another part of this paper it is suggested that the intimidation display of the nighthawks, which resembles that of a raptorial bird, may have some relationship to the reaction of other birds to them.

BIRD ASSOCIATES OF THE NIGHTHAWK AREA

Breeding birds
- Sparrow Hawk
- California Quail
- Killdeer
- Western Mourning Dove
- Lewis Woodpecker
- Arkansas Kingbird
- Ash-throated Flycatcher
- Barn Swallow
- Western Meadowlark
- Bullock Oriole

Breeding birds of neighboring hill (voice records)
- California Horned Lark
- Rock Wren

Birds using region merely for foraging
- Turkey Vulture
- Western Red-tailed Hawk
- Barn Owl
- Cliff Swallow

Casual birds
- Black-crowned Night Heron
- Golden Eagle
- Ring-necked Pheasant
- Hudsonian Curlew
- Anna Hummingbird
- Allen Hummingbird
- California Woodpecker
- Red-shafted Flicker
- Black Phoebe
- Violet-green Swallow
- Rough-winged Swallow
- California Jay
- Plain Titmouse
- Bewick Wren
- California Shrike
- Yellow-throat
- Red-wing
- Brewer Blackbird
- English Sparrow
- House Finch
- Willow Goldfinch
- Green-backed Goldfinch
- Brown Towhee
- Spotted Towhee
- Song Sparrow
- Lark Sparrow
- Gambel White-crowned Sparrow

Nesting Territories.—Smith (1910, p. 103) and Bailey (1928, p. 348) report the Texas Nighthawk nesting on adobe roofs at Brownsville, Texas; Sharp (1907, p. 88) and Tyler (1913, p. 57) in vineyards at Escondido and near Fresno, California; Sumner (1931, p. 89) on alkali barrens in Merced County; Eifrig (1930, p. 514) on smooth, hard beach sand at Velasco, Texas; Davie (1889, p. 229) on bare ground; Taylor (1912, p. 22) in rocky country; Bendire (1895, p. 174) on parched gravelly mesas of southern Arizona; and Mailliard (1901, p. 123), Dawson (1923, p. 1068), Grinnell and Storer (1924, p. 348), Woods (1924, p. 3), and Unglish (1929, p. 223) on the gravel of stream beds. The nests reported in this paper were placed on the gravel of the Coyote River bed or its adjoining gravel flood plain, without any indication whatsoever that any effort had been made by the parent bird to form a nest structure. Their protection, it seems, rested in the fact that the two eggs (in all cases there were two eggs), with their dark markings, resembled closely the pebbles among which they lay. The eggs were light clay-color, speckled, lined, and delicately blotched with olive brown and faint violet. At times there was enough difference between the eggs of a pair that they could be individually identified.

A table has been made of the twelve known nests found in the years 1929, 1930, 1932, and 1933, with data regarding the relationship to other nesting sites of the same season, and remarks concerning their specific environment. The locations of these nests are shown in the map (fig. 46). Reference to the map will show that contemporaneous nests were never closer to each other than 700 to 800 feet, this indicating the extent of territory allotted to the nest site by the Texas Nighthawk.

Without exception the nest locations or the eggs were found by tramping the gravel beds of the wash, carefully observing flushing birds. If females left with distress simulation at a distance of ten feet or less, they thus disclosed the nest or prospective position of the nest.

NESTS OF THE TEXAS NIGHTHAWK

Nest	Date found	Immediate environment
1	May 22, 1929	3 feet above channel bottom. Bench sparsely covered with *Chrysopsis oregana* and *Brassica adpressa*. Low shrub, *Chrysopsis oregana* within 2 feet. Too low to offer shade.
2	June 7, 1929	Same pebbly bench as nest 1, same shrubs. Thin green shrub, *Senecio douglasii*, in flower 2 feet to southwest. No shade.
3	June 23, 1929	Gravelly bench. A grass-covered alluvial plain about 4 yards to the west. Bench well covered with *Chrysopsis oregana*, *Senecio douglasii*, and *Mentzelia laevicaulis*. No shade all day long.
4	July 12, 1929	Same as nest 1. Nest 9 inches northeast from base of *Baccharis viminea*. Shaded in afternoon.
5	May 3, 1930	Sloping terrace of dry east channel. No protecting shrubs nearby.
6	May 3, 1930	West side of *Baccharis viminea* fringing channel.
7	June 23, 1930	Sloping terrace of main channel. Base of *Senecio douglasii* 9 inches to the south offering shade.
8	June 27, 1930	Same as nest 4 of 1929.
9	May 19, 1932	Lower end of channel. Side fringe of *Baccharis viminea*.
10	May 21, 1932	Near fringe of *Baccharis viminea*.
11	April 22, 1933	
12	July 8, 1933	Nest under drift-covered limb of *Baccharis viminea*.

BREEDING BEHAVIOR

Cock Roosts.—As the map (fig. 46) shows, the contemporary nests of the Texas Nighthawks were quite widely separated, indicating that breeding territories were well established and distinct. In some cases, such as with nest 2, the male was frequently flushed from a position about 25 yards from the nest. In other words, this male had a location within the nesting territory. This he persistently occupied and when flushed

he would rise and circle with alarm notes. This was not true of all the males, however, for frequently in the east channel, at a time when no known nests were present there, from two to three males would be flushed near one another from this region. This was so characteristic that we named it the "cock roost." What relationship these males had with the incubating or brooding females could not be definitely determined.

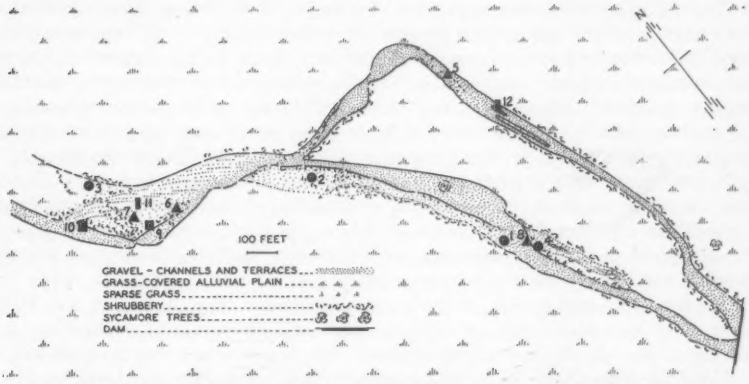

Fig. 46. Map of Coyote River channels, showing locations of nests of Texas Nighthawks. Nests of 1929 marked by dots; 1930, triangles; 1932, squares; 1933, oblong figures.

That this cock roost was regularly frequented was proven by the large number of droppings at this place, a characteristic spiral dropping readily identified. Attention has been called to this type of dropping by Grinnell and Storer (1924, p. 348).

Incidentally, the white bars in the wings of males readily served to distinguish them from the females, which had buffy bars. This difference also has been described by Oberholser (1914, p. 87).

Courtship Behavior.—The pursuit of the female by the male has been described by Lincoln (1917, p. 69) and Miller (1937, p. 42). Our observations confirm these reports, but in some respects are a bit more detailed. At nest 3, the male and female had been seen in the territory several days before the first egg was laid. On June 23, 1929, at 7:25 p.m., with the sun almost set, both birds rose and flew high, with the male in pursuit and frequently sailing close above the female for a few seconds with wings flexed sharply down over her. They circled and sailed off, lost to sight.

Two years later in the territory formerly occupied by nest 1, on May 11, 1931, just before 8:00 p.m., both male and female came into the territory, both flying, the male in pursuit and purring. Two days later in the same territory at 6:40 p.m. the male pursued the female actively, giving nasal notes. Several times, poised with down-flexed wings just above her, he uttered a vigorous *whăă*. Soon the male dropped to the ground and purred there, while the female circled over the territory where a second male rose to pursue her with no less ardor, although briefly. Then the female, hawking this way and that, came back and settled near the first male who was still purring. The purring went on almost continuously for 15 minutes, 6½ minutes without a stop. At 7:10 the female rose and left, soon followed by the male who circled about. A second male appeared and then a third male came. All three hawked over the territory paying no apparent attention to each other. They flew with easy flight, a few beats of the wings

and then sailing, tilting, suddenly rising, sinking, turning; but passage through the air was rapid in spite of the seeming leisureliness. At 7:20 the three birds left. Similar courtship antics have been recorded by Swarth (1920, p. 38), Grinnell and Storer (1924, pp. 347-348), and Miller (1937, p. 42).

Voice.—Records of the courtship voice of the male are incomplete, though a great many records of his voice are in our notes. The following records in connection with the foraging male are of some value, however. On July 8, 1930, when the male returned from foraging, he gave two or three nasal *whăă,whăă* notes, a note that can be imitated if said well to the back of the throat to add the nasal effect. Milder variants of this note were occasionally heard. They might be written *hrunk* or *whoo* or *choo*. The characteristic and frequent trilling or purring of the nighthawk seems to be a *chuck* note, very rapidly uttered, not less than five to six times per second, the rate of utterance being related to the interest of the occasion. When very rapid, it can be imitated by saying *chut-r-r-r-r-r-r* and placing the tongue against the roof of the mouth. At a distance this note sounds like the explosion of an outboard motor. When faintly heard, it sounds like a Screech Owl or like the singing of *Bufo americana*. This note occasionally ended with an incisive, somewhat guttural *wahugh*. All notes were given in a very low pitch and had remarkable carrying quality.

One behavior characteristic of the males in addition to voice should be noted here. When on the ground and approached by an observer they frequently go through a bobbing maneuver, lowering and raising the head. This is accompanied by a *thunk-unk*.

Many observers have given us records of their impressions of the voice of the Texas Nighthawk, Bendire (1895, p. 173), quoting Dr. J. C. Merrill, F. M. Bailey (1902, p. 229), quoting Vernon Bailey, Hollister (1908, p. 459), Tyler (1913, p. 57),

Fig. 47. Nest 11 of Texas Nighthawk, Coyote River bed, April 22, 1933.

Oberholser (1914, p. 93), Swarth (1920, p. 38), Dawson (1923, pp. 1065-1067), Grinnell and Storer (1924, pp. 347-348), Woods (1924, p. 6), Hoffmann (1927, p. 174), and Miller (1937, p. 42).

NESTS AND YOUNG

Incubation Period.—On June 7, 1929, nest 2 was found with a single egg. When the nest was visited on June 8, it had two eggs. This nest was visited on June 11, 12, 18, 20, 21, 22, 23, 24. On each of these occasions the female was incubating. On June 25, at 8:00 a.m., the nest contained 1 young and 1 egg. The second egg hatched at 11:12 a.m. on the following day, June 26. Presuming these eggs to have hatched in the order in which they were laid, an incubation period for each of 18 days is indicated.

At nest 3 the female bird was flushed from the same location on June 22, 23, 26, and 27. On June 27, the location was visited at 12:30 p.m. and between that hour and 7:25 p.m. an egg was laid. The nest site was not visited again until June 29, when 2 eggs were present. The second egg was narrower than the first. The incubating female was observed on July 1, 5, 10, 12, 13, 15, and 16. On July 17 at 2:00 p.m. one egg had hatched; the peep of the chick had been heard within the egg at 8:00 p.m. the previous evening. One egg, the narrower, had not yet hatched. On the evening of July 18, the second egg had apparently hatched and the halves of the two eggs were found scattered about within four feet of the nest. Though the young were not seen at this time, the empty shells proved that they had hatched. In this case the incubation period of the first egg, the broader, definitely was 19 days, and of the other egg perhaps 19 days.

Thus our observations agree with Bendire (1895, p. 174) who believed that "the two eggs are deposited on alternate days, and incubation begins with the first egg laid."

DURATION OF INCUBATION

Nest	Eggs laid	Eggs hatched	Number of days incubation
2	June 7	June 25	18
	June 8	June 26	18
3	June 27	July 16	19
	June 28(?)	July 17	19(?)

Brooding.—During the daylight hours the female was noted brooding the young regularly at all ages. The male was seen to brood for brief periods only in connection with his feeding visits. Notes concerning this brooding are taken up later in connection with feedings.

Feedings.—Feeding observations were made at nests 1, 2, 3, and 4, between the dates of June 11 and July 27, 1929.

The first feeding noted was at nest 1 on June 11, when the nest was under observation from 7:50 p.m. until 8:50 p.m. At 8:25 p.m. the male dropped down in front of the young, followed in less than a minute by the female. The flashlight was turned on them and the female flew away. The male had his bill thrust into the opened mouth of one of the young, and peristaltic motion was observed in the male's throat. He seemed undisturbed by the flashlight. After a moment the heads of the adult and the young were jerked back and forth (slightly up and down) and the male withdrew his bill and uttered soft notes. Both young birds, the fed and the unfed, reached up with wide-open mouths, uttering soft notes. Then the male's bill went down into the second mouth, followed by regurgitation without motion, and then rather violent jerking again. The same process was repeated with the first bird, then the second, longer each time with the first than with the second. The male departed. The feeding had taken about five minutes.

The second feeding noted was at nest 2, on June 27, when the nighthawks were under observation from 7:15 p.m. until 8:15 p.m. This time the male was again seen to feed both the young at 8:05 p.m. The jerking heads could be dimly seen.

On June 29, the nighthawks in nest 2 were observed from 7:14 p.m. until 8:40 and a third and fourth feeding record made. On this occasion, with the observers 15 feet removed from the young birds, the male came in, circled about with calls, and alighted about 2 feet from the young. After a few notes, he waddled over to them, squatted as both young reached up with uplifted wings and wide-open mouths. He fed the older and larger for at least a minute, with an up and down jerking motion at the end of the feeding, then for a shorter time fed the younger. While the male fed the younger, the older crept under him, then the younger followed. The male brooded them for about five minutes, then he rose, apparently not startled, circled, uttering calls, and flew away.

The male came in again at 8:15 p.m. and fed one of the young. A flashlight was used for necessary light. Though the female was in the vicinity and calling at the same time, she was not observed to feed; she flushed when the light flashed. The male departed again at 8:25 p.m.

The fifth feeding was again at nest 2 at 4:30 a.m. on July 1, when the nest was under observation from 4:15 a.m. until 5:45 a.m. Again it was the male that came in, dropped a foot from the young, waddled up to them and fed them both. During this feeding the female had dropped 18 inches in front of the male and watched with her head turned so that an eye was on her observers, but she remained motionless. Again the male brooded the young until he was disturbed at 4:55 a.m. by the raising of the heads of the observers who were about 15 feet away. He left with distress simulation. The female did not flush, but remained. About 30 minutes later the young birds uttered notes and the female crept nearer the young. One of them responded to her calling and crept under her feathers. This young bird soon emerged from the feathers and implored the female for food, but received nothing.

The sixth feeding recorded was made at nest 2 on July 4 when the nest was under observation from 7:30 p.m. to 9:30 p.m. This time the male came in at 8:10 p.m. and fed the young briefly. He left without brooding them. Though the female came in 20 minutes later and dropped about 20 feet from the young and called them, they did not go to her and she was not seen to feed them, but shortly went away.

The seventh feeding was at nest 4 on July 18, at 7:30 p.m. On that date the nest was under observation from 7:30 p.m. to 9:30 p.m. At this time the female brooding the young was approached by the observer to a point within 6 feet of her. The bird did not flush. She was seen to thrust her bill into the open mouth of one young in front of her, for a few seconds, and give three slight jerks. Upon the withdrawal of her bill, the young bird moved its bill as if it had been fed.

At 8:25 p.m. the male alighted near the female who then moved behind a neighboring shrub. One of the young went to her and the other stayed with the male and was fed briefly (eighth feeding). Subsequent to the feeding the young crept beneath the feathers of the male.

Again on July 20, nest 4 was under observation from 7:10 p.m. until 9:30 p.m. and a ninth feeding by the male at 8:00 p.m. was noted. The male had come into the territory a few minutes before this time and had brooded first one of the young and then the other which was separated from the first slightly. The male fed the second young bird. The female came in at 8:15 and the male departed. After various maneuvers of the female, jerking heads were noted in the bright moonlight. Perhaps this indicated feeding actions of the female.

On July 23, nest 4 was observed from 6:55 p.m. until 10:00 p.m. and the tenth definite feeding was recorded. With two observers prone about six feet removed from the young birds, the male arrived at 8:00 and dropped about one foot from the young

bird. He called, but without waiting, walked over to it and fed it. There was only one young on this occasion. After the feeding the male brooded the young.

The female arrived in the vicinity, flying about, and the male responded while continuing to brood the young. The male shortly arose and flew toward the calling female. The uncovered young walked between the two recumbent humans who were lying with not more than a foot space between them. The male then came up and brooded the young very briefly in this location. In a few seconds the male turned and walked away, the young following. He brooded it again at a distance of 3 feet from the observers. Again the male arose, and walked farther with the young trailing. Once again he brooded the young, but this was shortly terminated by a movement on the part of one of the observers, which sent the male away with striking distress display.

The next feedings recorded were in the course of an entire night's vigil extending from 7:00 p.m. until 7:00 a.m. on July 27 and 28, at nest 3. During this period the two observers were under blankets at a distance of ten feet from the young. The first feeding of the evening was at 7:50 p.m., again by the male, at which time he fed both young briefly. He had come into the vicinity in voice, dropped to the ground and continued calling, then finally moved to the young. He left without brooding them.

Again at 8:15 p.m. the male fed both young and left without brooding. Though the female had preceded the male, she seemed to spend her time attempting to induce the young to come to her. In the meantime the male dropped down in front of the young and fed them. The male returned at 9:00 p.m. but it could not be determined that he fed the young. Though the male was heard flying in the vicinity at 12:30 a.m., nothing further was noted of male or female until 5:00 a.m. when both were seen coming into the nesting vicinity and alighting some distance away. The observers at this time were in a sitting position.

At 5:25 a.m. the male was seen again and at 6:30 the female was flushed from the young and it was discovered at this time that they had moved 85 feet from the position where they had started the night.

The feeding is by means of regurgitation, which is the behavior one would expect with birds of the anatomical structure and feeding habits of the Texas Nighthawk. In spite of the relatively large number of observations, however, it will be noted that not more than one or two definite feedings by the female were recorded, the male being the chief carrier of food for the young. It may well be, since the observers of necessity were very near, that the greater solicitude of the female for the young prevented her from feeding a normal number of times, whereas the male, with less solicitude and therefore less fear, fed them more frequently while the observers were present.

One other item can be deduced from these observations and that is that the activity of the Texas Nighthawk in feeding seems to be strikingly crepuscular. The observed feedings were in the early evening and again in the early morning. If feedings extended throughout the night on the occasion of the night vigil of the observers, they were not seen, and the lack of notes from the parents would indicate that no such feedings took place during the hours from 9:00 p.m. until dawn.

Observations in support of this have been made by Wood (1924, p. 6), though one or two records in the literature (Grinnell and Storer, 1924, p. 347) indicate that these birds are, at times at least, active through the night.

Several attempts were made to photograph the parent bird in the act of feeding the young. On one occasion the young were tethered with a string in order to keep them within the range of the camera, and at another time a pen of rocks was built about a pair of young birds. In neither case would the parent bird come to the young.

Fig. 48. Young nighthawks of nest 1, less than 2 days old, in crouch-concealment; May 27, 1929.

Fig. 49. Young nighthawk of nest 1, approximately 5 days old, in crouch-concealment following flushing of female who left with distress simulation.

Growth and Development.—Our records of young nighthawks begin with the birds at hatching. At nest 2 a young nighthawk was able to toddle when less than 24 hours of age. The young of nest 1 when first visited on May 27 were heavily covered with down,

light tan in color, almost faint salmon (fig. 48). They were then less than 2 days of age and able to crawl to the calling mother.

Two days later no great change was observed in them except that their eyes were widely open and they were able to run rapidly 2 or 3 feet to their mother, with wings up. They were then approximately 3 days of age. On May 31, the young were able to walk with very little fluttering of the wings (fig. 49).

On June 2, with the young approximately a week old, the sheaths of the wing coverts were opening and the primaries were nearly an inch long. On June 7, with the young at approximately 12 days, one was appreciably smaller than the other, but both were well feathered. The color was reddish-tan with black spots (fig. 50). On June 12, the primaries were well unsheathed. On June 16, the larger bird, 21 days old, could make flights of 50 to 100 feet and the smaller bird made shorter flights. In this juvenal plumage they showed no bar in the wing (fig. 51). On June 18, they both were able to fly easily, and on the morning of June 20, the female and one young were flushed, this young bird flying and circling easily. The second young was not observed on this date.

The color of the young nighthawks varied in several of the other nests and one of the pair could be distinguished from the other by being more rufous or more buffy.

At nest 2, where only one young survived the nestling period, the young bird made its first flight of short distances on July 15, approximately 21 days after hatching. The birds at nest 3 were not under observation during the time they would have started flight; at nest 4, the one remaining young was observed on August 8 and was able to fly high in easy flight. It was then 22 or 23 days old. In nest 3 the egg tooth was still present on the older bird (about 12 days), but not on the younger. Incidentally, at nests 2, 3, and 4 only one bird reached flying age.

Fig. 50. Young nighthawks of nest 1, approximately 12 days old, showing juvenal plumage with only fragments of natal plumage remaining; June 7, 1929.

PROTECTIVE BEHAVIOR OF ADULTS AND YOUNG

Protective Behavior of Adult Female Nighthawk with Eggs or with Young.—At nest 1 extensive experiments were performed in an attempt to reduce the egg- and young-protective behavior of the bird to a definite pattern with respect to the character of the stimulus presented. To this end, following its discovery, May 22, 1929, visits were made to nest 1 and its resulting young, on May 24, 25, 27, 29, 30, 31 and June 2, 7, 12, and 16. Eggs were present on May 22, 24, and 25. The eggs hatched between May 25 and 27, so that all experiments made subsequent to May 25 were concerned with the behavior of the adult in connection with young or the experiments concerned the young themselves.

Fig. 51. Flashlight photo of young of nest 1, showing fully developed juvenal plumage; June 16, 1929; age about three weeks.

Nest 1 was found through the distress simulation of the incubating female flushing from the eggs. As we were scouting the gravel bed of the Coyote wash, a Mexican laborer came into the stream bed just in front of our party. The bird got up not more than two or three feet in front of him and went fluttering over the ground for a distance of 50 feet, flicking the pebbles with her wing tips. She made no audible sound other than that caused by the wings. This behavior, in response to the approach of a standing human, proved typical not only for this bird but for all incubating or brooding Texas Nighthawks.

The first extensive experiments dealing with the incubating bird were made on May 24 between the hours of 8:30 and 11:00 a.m. The bird was approached by the experimenter on hands and knees pushing a large camera on a tripod. Photographs were taken from time to time with attendant changing of plates and lenses, beginning at 15 feet and continuing until the camera was within 4 feet. The bird did not flush from the eggs in this period.

In the beginning of the hand-and-knee approach, the incubating bird remained mo-

tionless with eyes nearly closed (fig. 52). We shall call this close sitting of the strikingly colored bird a "concealment by self." This reaction is related to the "freeze" or crouch-concealment presented by all strikingly protectively colored birds, young or old, but differs here in that the eggs were also involved and the reaction was more marked

Fig. 52. Brooding female Texas Nighthawk in "concealment by self."

because of them. To human eyes, this protection through concealment by self was amazingly impressive; and to enemies not aware of the position of the bird or not accidentally wandering within a foot or two of her, the method would have afforded complete protection for the nest contents. Bendire (1895, p. 173) quotes Dr. J. C. Merrill as follows: "I have ridden up to within five feet of a female on her eggs, dismounted, tied my horse, and put my hand on the bird before she would move." In this case the Texas Nighthawk described by Merrill undoubtedly presented the concealment-by-self reaction.

The protective reaction, through concealment by self, changed as the experimenter and camera moved forward in that when pulling away a stem within 6 inches of the female, she opened her eyes more widely, spread her tail, raised wings, lifted her throat feathers, and gave a deep, throaty, rasping hiss. The hiss was not loud but very decisive. This was the initial step in her second protective reaction, that of intimidation display (figs. 53, 54, 55). The fingers of the experimenter were frequently thenceforth within an inch or so of the incubating bird, and though she withdrew an inch or so from the eggs, she did not flush.

Withdrawal of the experimenter from the vicinity of the nest was made by a backward hand-and-knee crawl without flushing the bird. After an interval of 30 minutes the nest was reapproached, this time with the experimenter upright. The incubating bird flushed at a distance of 5 yards, flicking the ground with her wings as she flew a distance of 75 to 80 feet. Thus she presented a third protective reaction, that of distress simulation. In their order of presentation to the animal on hand and knee, these reactions were: (1) concealment by self, and (2) protection by intimidation display. To the bipedal enemy they were: (1) protection through concealment by self, and (2) distress simulation.

On May 25, while visiting the region very briefly, the incubating bird gave reactions as of May 24, this time while a class of nearly thirty students observed.

The region was visited on May 27 at 9 a.m. The parent bird was 6 inches removed from her previous position over the eggs and was found to be brooding two downy

Fig. 53. Initial step in intimidation display of brooding female.

young. She was approached on hands and knees with camera as before, the lowered position beginning at a distance of 20 feet. Her initial reaction was the same as that of the incubating bird, namely, protection through concealment by self. Though the slit-eye was opened slightly, shortly it was closed again.

A hand was extended to her. Her reaction was that of intimidation display. This time fingers were actually put into her breast feathers. Her intimidation display became exaggerated as follows: she opened her mouth as the hand came near and at a

Fig. 54. Female in intimidation display, allowing herself to be touched while on the young.

too vigorous move on the part of the hand she flipped it with her wings and remained for a moment with wings and tail spread. Though this pose resembled later distress-simulation attitudes, it seemed to be rather a part of the intimidation display. This reaction had carried her a short distance from the young in the direction of her tormentor, but shortly she waddled back to cover them. Later she moved some 6 to 8

Fig. 55. Brooding female at peak of intimidation display.

inches away from the young and away from the experimenter. On these occasions she uttered a low note, not unlike a hen calling her brood. The note was *whunk, whunk, whunk,* now slower, now faster. Her *whunk* notes were made with closed mouth. Her throat feathers pulsed out each time. When she was greatly excited, the notes became *hrunk,* which was more pronounced than the others. The young responded by orienting toward the sound (fig. 57). On their movement, the female repeated her note more rapidly and spread her breast feathers sympathetically. The young crawled to her, one after the other, until both had crossed the 6 to 8 inches. The parent then cuddled them under her feathers with *whunks* of solicitude. All this time her human intruder was within 3 to 4 feet fully exposed and with a large camera.

The experimenter withdrew on hands and knees and reapproached in the upright position. The bird flushed at 10 feet with distress simulation, alighted within 30 feet partly spread and swaying, then flew again, flipping the ground with her wings. When approached this time, she flew again, flipping the ground. This distress simulation has been noted and described by Taylor (1912, p. 222), Tyler (1913, p. 57), Dawson (1923, p. 1069), Grinnell and Storer (1924, p. 348), Woods (1924, p. 4), and E. L. Sumner (1931, pp. 90-91).

The nighthawk was left at 10:10 a.m. She was back over the young at 10:25 a.m. When approached by the upright intruder this time, she flew directly at him, dropped to the gravel 30 feet away, widely spread. Here she remained quietly. When approached within 20 feet, she flew away with no further distress.

The experiments were continued this date to watch the variants of behavior if any. The bird was approached while crawling on hands and knees and also in an upright

position. On one occasion while crawling to her, she made no effort to fly but ran as much as 6 to 8 inches toward the hand of the experimenter as it moved toward her. Fingers were run into her feathers and her wing lifted. She moved over a few inches, called, and the young waddled to her. At this time both young and adult were very warm. The young came forth from the feathers, panted a moment and crawled back again. One last time the bird was flushed from her young by the experimenter in upright position. She was in "concealment-by-self" position and flushed at 20 feet, flying directly at the experimenter; she then swung to one side and alighted with wings spread in distress simulation. When flushed from this position, she flicked the pebbles for 30 feet and alighted as before. She was left at 11:15 a.m. At this time the female and young were about 18 inches from the place where they had been first seen.

Experiments with the brooding female during the forenoon and early afternoon were continued on May 29 and 31 and on June 2 and 7. The behavior, in spite of the marked growth of the young, was not greatly different from that noted on May 27, except perhaps a bit more exaggerated. The bird was approached in an upright position from different angles, with or without the camera, on many different occasions. Always the female presented a "concealment by self" upon these approaches. She then flushed from the young at distances varying from 2 to 10 feet, with tail adroop, wings striking down and forward, flipping pebbles and vegetation, and rocking from side to side, but with no vocal note, alighting at distances varying from 30 to 75 feet, usually with wings spread in a distress-simulation posture (fig. 56). This behavior was also presented subsequently by the female of nest 4. As noted later, this may have been the same individual.

Fig. 56. Female nighthawk at termination of distress simulation flight.

When the experimenter approached the bird in a crawling position, she again flushed with distress simulation unless she was covering the young. In most cases, however, when actually brooding, she allowed the experimenter to approach very near and would permit herself to be touched, would exhibit marked intimidation display with tail spread, wings lifted, and mouth widely agape. She would move several inches from the young toward an outstretched finger. The proof of the intimidation display in this experiment lies in the fact that she would not close the mouth upon the intruding finger.

The female in returning to the vicinity of her young subsequent to her flushing would attract the young to her by a mild *chunk, chunk, chunk*. She expressed a mild distress, when the experimenter was near her young, by a *whunk*. A deep distress, such as occasioned by the picking up of her young when she was near, was registered by a very throaty, guttural note, *whō-ăwk*.

For a period of two hours, from 8:00 to 10:00 p.m. on June 12, the young were observed. The female came in and alighted in various positions near the young but never actually came to them. She maintained a constant call that varied from *cwa, cwu* or *cwut* to a most frequently uttered *hrunk, hrunk, hrunk*. The young had been tethered in an attempt to get flashlight photographs of the feeding, and though they struggled they could not reach the calling female. It is interesting to note that the female at these hours gave no reactions comparable to those of the daylight period.

Thus the protective behavior of the brooding female Texas Nighthawk was strikingly similar to the behavior of the incubating bird, though more pronounced. This consisted of: (1) concealment by self, whether the enemy approached her in an upright or crawling position; (2) distress simulation presented to the upright enemy; (3) intimidation display of marked character, presented, however, only to the crawling enemy.

It should be noted at this point that the intimidation display as described here was not secured from the incubating or brooding nighthawks at nests 2 or 3, though experiments identical with those used in connection with nest 1 were employed. But at nest 4, the location (fig. 46) and dates of which would indicate that it was a second nesting of pair 1, the female displayed reactions identical to those reported for number 1. This behavior constituted a strong confirmation of the opinion that the female at nest 4 was the same as the female at nest 1.

Protective Behavior of the Adult Male.—The male of nest 1 was not observed until the evening of June 11 when he came into the vicinity at 7:30 p.m., flying here and there and uttering notes. He alighted near the young at 8:00 p.m. and, incidentally, located them for us. We flushed him at 8:00 p.m., and though he was near the young, he went without distress simulation, and continued to fly in the vicinity with notes of solicitude but without protective behavior.

In no case was the male observed to incubate, and only after sunset and in connection with the feeding of the young was he observed to brood. On several of these occasions when the male was brooding, he left the young with distress simulation upon being flushed. The male was not observed near nest 1 during daylight hours, but at nest 2, the male was always near at hand and became vociferous upon the approach of the intruder. This may have constituted a form of nest-protective behavior.

Protective Behavior of the Young.—The young of nest 1, the experimental nest, hatched between May 25 and 27. When they were first visited on May 27, they were about 6 inches removed from the former position of the eggs. This apparent mystery was soon solved, when the birds later on this date, were noted to move 6 or 8 inches to the calling female while the experimenter was very near. These young were certainly not over 48 hours old, perhaps much less, and were able to crawl, however haltingly, at this time. Several times during the experiments of this date this was repeated.

The young of the nighthawk are precocial in that they are born with a heavy coat of down (fig. 48) and have some sense of vision and are able to move shortly after hatching, but of course because of their highly specialized food requirements, they must be fed by the parents until they are able to fly skillfully. They differ, therefore, from the precocial young of gallinacious birds and such charadriiform birds as plovers or sandpipers, but resemble such charadriiform young as those of terns or gulls which must be fed by the parents.

The literature has one or two observations in this connection. For instance, Taylor (1912, p. 223) and Woods (1924, p. 3) noted that the young were in a different position each day and could move over the ground at a fair rate of speed. E. L. Sumner (1931, p. 90) makes the observation that the young of this bird were noted to have moved and he suggested that the parents must have done it. Our observations show in many cases that the young were able to move themselves, though slowly, shortly after hatching.

On May 29 the young were 8 feet from the position noted two days previously. They were four days or less in age and they ran two or three feet with wings uplifted to the calling mother; their note was a weak *chēē-uk*. The young at times, in spite of a cool wind, came out from beneath the feathers of the mother and panted, very shortly returning. In addition to the protection afforded by the mother to whom they ran when she called, the young presented a crouch-concealment or "freeze." This they would maintain for a short period only, for the female was usually in the vicinity and calling them, with the result that they broke the crouch-concealment and moved in her direc-

Fig. 57. Young nighthawks, about 5 days old, breaking crouch-concealment and orienting toward voice of calling female.

tion. Our records do not show when the crouch-concealment reaction first appeared, though at nest 2 young less than 24 hours old did not exhibit this behavior.

On May 31, when the young of nest 1 were 20 yards from the nest site and 18 yards from where last seen on May 29, they presented a picture of crouch-concealment when the female was flushed from them (age 6 days or less, see fig. 49). On this date it was possible to induce crouch-concealment with the hand or with a sudden noise or movement, and the young seemed to hold it as long as the mother was quiet. But as she remained, under these conditions, within a few feet and called almost constantly, they soon responded and oriented to the direction from which came her call. When the female left with distress and the experimenter approached upright, the young held crouch-concealment until her return (5 to 15 minutes).

On June 2, the young were 28 yards from where they were left May 31 and 56 yards from the original nest site. They were found after about 25 minutes of systematic tramping, starting at the point where the young had last been seen and criss-crossing downstream. When the female flushed from the young, they were discovered in crouch-concealment. Though a sudden move would cause them to twitch (in the sun they also panted), or open their eyes wider (unlike Killdeer in this respect), they made no notes until touched. Then, before moving, they uttered their low, plaintive *whee-ur* or *chee-urr*. They ran when prodded a little with the finger, but shortly stopped and crouched. Any slight manipulation would induce crouch-concealment: (1) placing a jacket over them; (2) placing hand over them and gently removing; (3) laying on and off of dark cloth; (4) a sudden noise, scramble or commotion on the part of the experimenter when they were running. During this period no notes were to be heard from the parent bird. The young were then 8 days old or less.

On June 7, the young were discovered in the usual way by criss-crossing and subsequent flushing of the female, and they were found this date as before in crouch-concealment after the female had flown (fig. 50). At this time their developing feathers were reddish-tan with black spots. On the reddish brown stones they were very effectively concealed. They were in crouch-concealment always, except when there was motion near them such as that caused by removing stones or pulling grass. This caused them to breathe faster, open their eyes wider and move, though almost imperceptibly. On this date they were teased by the experimenter and would run, lifting their wings only when most excited. Additional teasing caused the larger of the two to give an intimidation display (fig. 58) by opening its mouth and spreading its wings without running. Still further teasing caused it to run.

Fig. 58. Young nighthawk, about 12 days old, responding to experimenter with intimidation display.

This was a striking reaction to secure from the infant bird. At this time it was approximately 12 days old. It is a reaction one secures from the advanced young of rap-

torial birds. The intimidation display of both adult and young was peculiarly like that of raptorial birds in spite of the lack of close relationship to those groups. It has been noted that the reaction of other birds to nighthawks resembles that to raptorial birds. It is suggested that if there is any relationship here it lies in the fact that the plumage of the nighthawks is owl-like, and it would seem that they have developed in their protective behavior some of the reactions of that group. In this connection, 8 or 10 English Sparrows and 6 robins were noted mobbing an Eastern Nighthawk (*Chordeiles minor*) as it sat lengthwise on an elm tree at Ithaca, New York, on May 12, 1927.

During the above experiments on intimidation display with the young, the female was not heard to utter any notes. The notes of the young when teased were a quavering, low *chēē-ēē-ēē-ēē*.

On June 12 the nighthawks were visited in the evening after sunset. The young were found this time by flushing the male. They were not over 15 feet from the spot where they had been found on June 7 and near the place where they had been left on June 11. This was a total of 72 yards from the original nest site.

The male continued to fly near for some minutes and the young responded to his call by an almost inaudible note, a high-pitched, wheezy, mild *chee-ee-ee-ee*. Shortly the female, who had not been in evidence any of the preceding time, came in. Her *chunk* or *whunk* was somewhat different and much softer than that of the male, and the young immediately responded with a much more pronounced squeal. In the dusk the young would not remain in crouch-concealment but wanted to run shortly after the experimenter began working near them, though they had not been touched.

On June 16, again after sundown, the nighthawks were visited. The parent birds were not near and the young were found this time by carefully working over the gravel. They had moved nearer the original nest site and were only 35 yards removed from it. On this date and at this time of the day, the young, well advanced, were alert, moving with each abrupt move on the part of the intruders, but holding their original position. The young began to move at 8:00 p.m. when they were worked with in an endeavor to photograph them. One bird got up and ran, the other followed and then began to fly. The larger could make flights of from 50 to 100 feet, flying easily, like a bat. The smaller bird made shorter flights.

To these observations, all applying to nest 1, should be added a few observations of the young of other nests. Thus, at nest 2, one of the young when 5 days old, opened its mouth as if begging for food when a hand was placed near it; and a food-begging response was also secured by touching its bill. All this was shortly after it had been fed in the early evening. This reaction also was presented by the young in nest 3 at 6 days of age, when talking and tapping on the ground with the finger caused the smaller to peep and run to the finger with open bill and an attempt on its part to swallow the finger. Three days later, noises on the part of the experimenter caused the young to peep, and one of them came halfway toward the experimenter.

At nest 4, a young nestling, then 24 hours old, stumbled toward the experimenter in response to a tapping on the ground and calls in imitation of its mother. When it had come a little more than 3 feet, it opened its mouth in response to a finger put on its bill. It showed no evidence of fear. The following day at this nest, one of two young (probably the older) responded when touched and the other did not.

On July 20, at 7:10 p.m., as the observers established themselves on the ground near the young, these same young (nest 4), then 3 and 4 days old, again came 4 feet to the observer importuning for food. On July 27, when the young were 10 and 11 days old, the smaller still responded with a food-begging pose during an imitation of the parental

feeding call. The larger did not. This would indicate that a distinct fear instinct came to the nighthawks at about the age of 11 days. Three days later, July 30, no such response could be obtained, but instead the young responded with a weak intimidation display.

It is suggested that this behavior resulted from one of two causes. Either the young at these early ages had not yet developed the instinct of fear, or they were coming to the experimenter as a result of sounds or tappings, as if in response to the calls made by the parent.

The protective behavior of the young had the following elements: (1) as long as the young were brooded, concealment by the parent bird sufficed as protection for them; (2) the flushing the parent would leave the young in crouch-concealment wherein they supplied their own self-concealment through coloration, which became strikingly protective as their feathers advanced; (3) almost from the beginning these precocial young were able to run to cover, however haltingly, though this cover consisted of the female bird who caused them to run by her calling; (4) not until they were about three weeks old were they able to substitute flying for running; (5) the astonishing method of protective behavior presented by the nighthawks was their intimidation display which was first presented when they were approximately 12 days old.

SUMMARY

1. A total of 81 visits were made in study of the Texas Nighthawks nesting in the Coyote River bottom near Coyote, 10 miles south of San Jose, Santa Clara County, California.

2. It is noted that though the Texas Nighthawk is listed for the Lower Sonoran Life-zone, the region under observation is Upper Sonoran, but certain species of plants indicate that it was, in part at least, a Lower Sonoran "island."

3. All nesting territories studied were on the gravel of the Coyote River or on the immediate flood plain and in no case was there any evidence that any action was taken by the parent birds to modify the nest site, unless the saucer-like depression in hard sand that contained the eggs of nest 4 represented such a modification.

4. A total of 12 nests was found in the years 1929, 1930, 1932, and 1933, four nests being the maximum for any one year. Without exception each nest had two eggs.

5. Contemporaneous nests were never nearer to one another than 700 to 800 feet.

6. In only one case was the male observed to have established a roosting place near his incubating female. Two to three males were frequently flushed from a region to which the name "cock roost" was given.

7. At nest 3, a male and female Texas Nighthawk were flushed from the same territory on several days before eggs were deposited there.

8. Courtship behavior consisted of the male flying with down-flexed wings above the female. In some instances two and again three males were noted pursuing a single female.

9. The incubation period was 18 days in one case and 19 days in another.

10. During daylight hours only the female brooded. The male brooded briefly in connection with feeding visits.

11. Most of the 10 observed feedings were by the male, though it is suggested that the presence of the observer may have been a restraining factor in the case of the feeding behavior of the female.

12. All feedings were by means of regurgitation, wherein the bill of the parent was thrust into the open mouth of the young, the food brought forth by peristalsis in the regurgitation. Each feeding was terminated by a violent agitation of the heads of both the bird supplying the food and the one being fed.

13. Usually both of the young were supplied with food by the attending parent on the feeding visits.

14. Feedings noted were all crepuscular, at 9 p.m. or earlier, or again at 4:30 a.m. or later.

15. The young are able to walk, though haltingly, shortly after hatching. When only one or two days of age, they would crawl to the importuning female.

16. Primaries were nearly an inch long and the wing coverts unsheathing when the young were approximately a week old. The young at 12 days had lost most of the natal down and were well feathered.

17. The first ability to fly was noted at the age of 3 weeks. Easy and consistent flight was performed at 23 days.

18. The young hatched at 24-hour intervals (as proven definitely by observations of nests 2 and 3), and the resultant difference in size of the pair could be noted throughout the growing period.

19. The protective reactions of the incubating female nighthawk to a quadripedal animal were in the order of presentation as follows: (a) "concealment by self," and (b) protection by intimidation display.

20. To a bipedal enemy the protective methods of an incubating female were: (a) protection through "concealment by self," and (b) distress simulation.

21. "Protection by self" and distress simulation were devices presented by all incubating Texas Nighthawks, but protection through intimidation display was presented by the female of nest 1 and by the female of nest 4 only. Nest 4 was probably a second nest of the female of nest 1.

22. The protective behavior of brooding female Texas Nighthawks was similar to that of the incubating bird except that it was more pronounced.

23. The male did not incubate. He frequently uttered notes in the vicinity of eggs or young upon the approach of an intruder. These may have indicated solicitude.

24. The male, when flushed while brooding, left the young with typical distress simulation.

25. The young were protected first by the concealment of the brooding female.

26. Under certain conditions the young presented a crouch-concealment protective reaction at an early age, and such reactions were used until they were able to fly.

27. The crouch-concealment reaction could be induced by the experimenter through several manipulative devices.

28. The young ran to the cover presented by the calling female almost from the first.

29. At approximately 12 days of age, the young of nest 1 presented intimidation display in self protection when they were annoyed by the experimenters.

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San Jose State College, California, July 1, 1938.

THE SINGING OF THE MOCKINGBIRD

WITH ONE ILLUSTRATION

By LOYE MILLER

More than fifteen years ago, Donald R. Dickey wrote for the *Condor* (vol. 24, 1926, pp. 153-157) a brief article on the singing of the mockingbird (*Mimus polyglottos*). It was a thought-provocative article in which he commented first upon the early age at which a certain individual appeared to have arrived at the mimetic stage, that is, by the time of the first winter plumage. In discussing the case, he suggested the possibility that long racial habit in mimicry of certain notes had eventually impressed those notes upon the genetic complex of the species, so that the young individual inherited, rather than learned, the song of its unrelated neighbor.

I feel, however, that he was not himself impressed with the plausibility of his own suggestion and during the remainder of his paper he placed the word *imitation* in quotation marks. Later on he makes the more credible suggestion of "parallel ability and adventitious similarity rather than actual and individual mimicry."

With this latter proposed explanation I find myself more nearly in accord. My contention from experiments with cage-bred linnets has long been that the racial song pattern is inherited and only the slight and more superficial variations from the norm may result from the impress of an auditory environment upon the individual. The susceptibility of different species to such environment differs greatly in degree. Even the various species of the parrot order are widely diverse in their response to "education." Nevertheless, we must concede that their vocal patterns can be modified in a great many instances, even though they remain fundamentally those of parrots.

May it not be similarly true of mockingbirds? We must concede that there is a limited number of sounds producable by even so complex an instrument as that of the mocker. He has an inherent psychic urge to run off a great variety of short samples of his song equipment, throwing his vocal apparatus into kaleidoscopic changes very much as a playful kitten may throw his body into a series of rolls, turns, and dashes without purpose other than to express his own exuberance. The best of us run out of ideas at times, and then all at once, in our association with our colleagues, we are inspired to new ones (too often they are imitated) and we are urged on to new expressions. The mockingbird, too, has a limited originality and his outpour of melody is not a continued forward stream. It comes back and repeats itself so often that the analytic listener is surprised at the brevity of his cycles. Might he not be inspired to new ideas by his auditory environment and from time to time add the note of another species to his set of records? I think he does just that thing. Should he, however, be branded as a plagiarist and his artistry held less perfect? To this day I well remember my first hearing of Dvorak's "New World Symphony." I sat fascinated by that wonderful tapestry of sounds emanating from a great orchestra, while now and again there came out first one and then another fragment of melody that had been with me from childhood—snatches of negro melodies woven as *motifs* into a splendid classic of orchestration. We call Dvorak an artist, not a plagiarist. The copyist is not creative. On the other hand, the artist seizes an inspiration, adds his own personality to it, and creates a masterpiece. I think the mockingbird comes near to earning the same title of artist.

But my presentation is perhaps too largely preamble—resembles a mushroom that is all top with but a slender thread of mycelium to relate it with the *terra firma* of fact. I have lately been making some more analytic studies of the mockingbird's song with results that greatly surprised me.

First of all I would refer again to what Dickey aptly called "adventitious similarity" and what I would prefer to call *fortuitous* similarity. One of the seemingly acquired notes that creeps into the song of many individual mockers is that of the California tree frog (*Hyla regilla*). This note is most faithfully reproduced, but had the tree frog anything to do with it? *Hyla* is a chorister rather than a soloist. Rarely is an isolated individual allowed to sing for any length of time without being joined by his choral background, hence the non-analytic mocker would have to imitate a whole frog pond rather than an individual frog. While collecting along the shore of a tiny islet in Carribean waters, I fired at a heron. Immediately there started up in the jungle a few yards back from the salt water, a chorus of perfectly good *Hyla* notes. These notes, however, came from a group of toucans, tropical birds who had never heard a California tree frog and who were giving their tribal note of surprise and alarm, not singing. My suspicion is that much of the mocker's mimicry is of this sort, that is, purely fortuitous.

The mocker's song seems at first impression to be but a tumbling sequence of unrelated notes. Close attention, however, shows it rather to be a linear mosaic of many records, each record presumably involving a special set-up of the vocal apparatus and consisting of several (often three or its multiple) repetitions of exactly the same *motif*. Such a record has been taken as a unit in my quantitative studies of the mocker's performance. These units soon become easily recognizable to the careful listener and he is surprised to find that their number is smaller than he had at first supposed. The bird soon comes back to a new start and begins "telling his beads" over again, though not necessarily in just the same sequence.

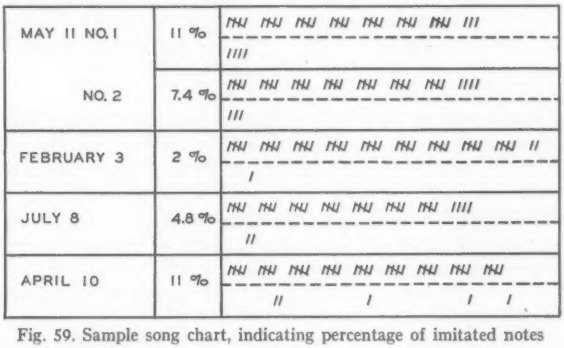

Fig. 59. Sample song chart, indicating percentage of imitated notes (see text).

We may next inquire as to the origin of the *motifs* from which these units are built. I have lived the larger part of two generations in the mockingbird's territory in southern California and have, most of that time, had a growing interest in, and appreciation of, the variety of notes produced by birds of all sorts that would form the auditory environment of this supposedly impressionable songster. In taking notes on his performances I have given him the benefit of every doubt, since the element of human judgment must necessarily enter into the study. The accompanying chart (fig. 59) represents a few samples of song charts made to determine the percentage of imitated notes. Each check mark represents one set-up of the vocal apparatus—one pearl in his rosary. As soon as he changed the set-up and shifted to another bead, another check was made. If the *motif* was original, the check went into the upper space, above the broken line, if possibly borrowed, the check went into the lower space. Seldom did the performance extend

to include as many as fifty changes without a more or less extended pause. Yet never did the rosary contain anywhere near that number of different beads. In other words, each bead may be repeatedly told.

The percentage of imitation is rather interesting. The figure is so surprisingly small! April and May records came from birds in full ecstatic song; February is a time prior to full ecstacy, whereas July represents a partial wane with the onset of postnuptial molt.

It will be noted that the percentage of mimicry increases within the breeding season, and I have previously observed that the amplitude of variability in song appears to be less during the winter, and mimesis may even entirely disappear.

Again, in none of these records did more than four neighbor species appear in the imitated repertoire, often only three and these would be repeated. Different individual mockers in the same locality do not necessarily borrow from the same neighbor species, hence the list of imitated species for an area is greater than the performance of any one mocker would cover. The following is a list of such neighbor species in the area most carefully studied whose notes have been recognized with a varying degree of certainty in the performances of a number of mockingbirds.

Species	Type of note	Nature of mimicry
Shrike	song and call note	excellent, probably true mimesis
California woodpecker	*jakob* call	excellent, probably true mimesis
Tree frog	breeding note	excellent, probably fortuitous
Brewer blackbird	*chuck* call	excellent, possibly fortuitous
Bullock oriole	chatter and part of song	excellent, probable mimesis
Killdeer	typical note	good, probable mimesis
California jay	rising note	excellent, possibly fortuitous
California quail	assembly call	poor, doubtful
Sparrow hawk	*klee, klee*	too high pitched, doubtful.
Black phoebe	song	fairly good, doubtful
Burrowing owl	chatter	fair, very doubtful

This list includes, I am quite satisfied, both fortuitous resemblances and true imitations. Reproductions of notes of some species that are marked doubtful are too crude to be the mimetic efforts of so accomplished a performer. Those marked excellent are too perfect to be fortuitous, except where their simplicity might permit coincidence. The perfect *jakob, jakob, jakob* note of the California Woodpecker was given within fifty yards of a communal storehouse of that species, but has not been heard about my home in Los Angeles two miles from the live-oak belt. The perfect notes of the shrike, on the other hand, are commonly used about the home place where shrikes abound, but they were not heard in the woodpecker's territory.

The arrival of Bullock Orioles in April seems also to have stimulated a mocker near my home, and he has begun only lately using the chatter and part of the song of the oriole which has not been heard earlier in the season.

The note of the Sparrow Hawk is a very simple one and quite likely would fall in the fortuitous class. I have heard it perfectly rendered, on higher pitch, by an ecstatic male Green-backed Goldfinch.

The very large element of personal judgment in this presentation is freely confessed and other students of the mockingbird are quite at liberty to point the finger of criticism at its unscientific frailties. Yet I am as great a lover of the mockingbird as any of them can claim to be. I would further contend that the more lasting appreciation is based upon the more rounded understanding. The inquiring iconoclast need not necessarily be a "dispeptic killjoy."

My personal reaction, then, in regard to the singing of the mockingbird, may be summarized as follows:

1. A single song is a mosaic of one dimension—a sequence of *motifs*.
2. Each *motif* is commonly repeated from three to nine times before shifting to the next *motif*, thus making up a unit.
3. The bird usually employs from thirty-five to fifty of these units to complete a mosaic, then pauses for a period.
4. An aërial performance may occur without interrupting the continuity of a mosaic.
5. The number of different units is actually smaller than the listener would at first suspect, so that the same unit may appear again and again in a completed mosaic.
6. The *motifs* are largely original. Rarely do as many as ten per cent of them resemble the notes of other species.
7. These resemblances may be purely fortuitous or they may be actually mimetic.
8. Mimesis of certain notes is so completely perfect as to be almost indisputable.
9. Certain mimetic notes are heard only in the area or at the season when the imitated species is present.
10. The fortuitous resemblance is held to be due, not to inherited mimesis, but to the great complexity of the mocker's vocal and psychic equipment.
11. Amplitude of variation in mosaic pattern is greatest in the spring months and may sink to the zero mark in winter.
12. During fall or winter the song may become almost ruminative in character. This effect may be the result of immaturity, sex, season, or momentary psychic state.

The mocker is not a plagiarist. He is, in my opinion, a true artist.

University of California at Los Angeles, May 3, 1938.

SOME FEEDING HABITS OF THE RED-BREASTED SAPSUCKER

WITH ONE ILLUSTRATION

By CHARLES G. DANFORTH

From February 12, 1937, to March 29, 1937, records were kept of the feeding habits of a single Red-breasted Sapsucker (*Sphyrapicus varius daggetti*) on the University of California campus, Berkeley. It was not until further study was made of other individuals, however, that I felt justified in reporting these records. The sapsuckers subsequently observed were on the Stanford University campus and at Echo Lake in El Dorado County, California. The following field observations start with the individual on the University of California campus.

Method and Location of Work.—The feeding actions of this individual corresponded to those of other sapsuckers that were subsequently observed. Clinging by means of toes and tail to a tree trunk, the bird generally held its body well off the tree, and maintained a pose of motionless alertness. When actually feeding or working, the bird changed its position by hitching up or down the limb without use of the wings. Little if any work was done when on the under side of a branch. As a general rule, no noise was made, either vocally or in working on the green wood. The actual drilling of the holes was accomplished by a side-to-side "chopping" with the closed bill, this often causing chips to fly to distances of ten or fifteen feet. There was an average of two strokes to the second, and the bird required one and one-half minutes to make, or at least to start, a hole. However, the work was never continuous, there being a period of about three minutes or less of work, followed by a resting time of often as much as fifteen minutes.

During the period of observation, the weather was poor and downpours were frequent. However, I never once saw the sapsucker during a rain, and only twice when the sky was overcast. Apparently little boring was carried on in inclement weather. In all, the bird worked on at least eight different trees on the campus in the season of 1937, and I found evidences of work during previous years, possibly by the same bird, on eight other trees in the same general locality. The trees bearing *old* workings were:

2 Acacias (*Acacia elator*) near Hearst Mining Building, south of the sundial
1 Mount Atlas cedar (*Cedrus atlantica*) southwest of the stadium
1 Eucalyptus (*Eucalyptus viminalis*) on Big C Hill
1 California bay (*Umbellularia californica*) on hill above the Greek Theatre
1 California live oak (*Quercus agrifolia*) south of Giannini Hall on Strawberry Creek
1 American elm (*Ulmus americanus*) south of Agriculture Hall, near creek
1 English oak (*Quercus rober*) beside the above-mentioned elm
1 Oak (*Quercus* sp.) at 1849 Arch Street, Berkeley

Each of these trees showed evidence of having been worked on for at least one year, and the number of holes ran from fifty, on the Arch Street oak, to at least three thousand on the eucalyptus. The trees upon which work was carried on this year were:

1 California bay (*Umbellularia californica*) by California-Giannini Hall road bridge
1 California live oak (*Quercus agrifolia*) at the same locality
1 Mount Atlas cedar (*Cedrus atlantica*) south of Agriculture Hall, on creek bank
1 Mount Atlas cedar north of California Hall
3 Poplars (*Populus nigra*) at northeast corner of Life Sciences Building
1 Poplar (*Populus nigra*) at 1849 Arch Street, Berkeley

In observing the workings on these latter trees, a surprising amount of data was obtained. I counted 2000 holes bored on the bay tree, 6 on the oak, 85 on the cedars, and 189 on the poplars—a total of 2280 holes bored during a few months. Of these, 574 were made as I observed the bird working. Inasmuch as the period over which I kept notes was forty-two days, this means an average of over thirteen holes a day. However, since the bird was not observed working on overcast days, and since twenty-eight of these days were overcast, the daily average bored on "working days" was forty-one. Because it was impossible to watch the bird continuously, and because there may have been other workings of which I was unaware, I feel that an average of twenty-five or thirty holes bored a day is a conservative estimate. It must be remembered that the above estimates are of averages, since I have seen a working increase fifty-six holes between dawn and dark of the same day; and I once saw eighty-five holes bored within a period of thirty-six hours.

Types of Boring.—A study of the workings themselves leads to a better understanding of the feeding habits of this species. There seemed to be a stable "ground plan" for all of the holes bored (fig. 60 A, C). They were usually broader than high, and their depth depended upon the thickness of the bark, since they generally went only to, or more rarely through, the cambium. They were usually of a tapered form, but occasional large ones were undercut at their sides. Large compound holes were formed by merging two or more holes vertically, a horizontally compound hole being rare. These compound holes, as contrasted to what I called the single or simple holes, often had the bases of the septa remaining, so that the number of borings making up a compound hole could readily be computed. A simple hole was usually about 6 mm. wide, 4 high, and 6 deep, while the largest compound hole I observed was 110 mm. high, 16 wide, and 8 deep.

There were two types of workings (fig. 60 E, F), which I have designated as "spiral" and "grouped." The spiral type consisted of a circle of simple holes surrounding the trunk, but often ending at a level below that of the starting point, thus making a spiral. When this occurred, the holes of succeeding turns tended to be directly below those of

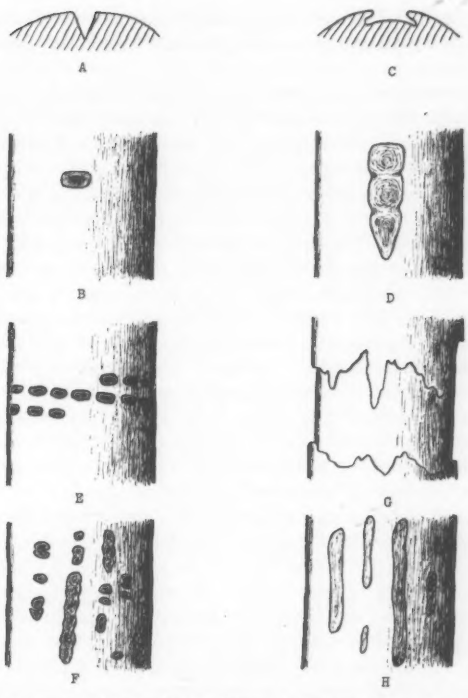

Fig. 60. Types of sapsucker workings. *A*, sectional view of simple hole; *B*, surface view of same. *C*, sectional view of compound hole; *D*, surface view of same. *E*, spiral working. *F*, grouped working. *G*, girdling working. *H*, early stage of girdling.

the turns above, so that there would be present both horizontal and vertical alignments. This type of working was limited to tree trunks of small diameter. The borings used on large trees were of the grouped type, the workings consisting of vertical lines of compound holes in which there was no horizontal alignment, and only one side of the trunk was worked over. There was still a third type of boring which consisted of a simple hole and which evidently was made by the bird as a "test boring." I have called these "adventitious holes."

Animals near the Workings.—In watching these borings, I kept records of animals which might have been attracted by the sapsucker's work. On March 13, I found an isopod in a simple hole on one of the cedars, but I do not believe that it was there for the sap or pitch. Most birds seen near the workings seemed to regard them with indifference, but there were a few exceptions. A Ruby-crowned Kinglet (*Corthylio calendula*) was frequently seen fluttering at the fresh holes on the bay tree, although whether for insects (none was ever seen) or sap, I could not determine. At this same place, a Red-shafted Flicker (*Colaptes cafer*) hopped and peered about the workings, but did not seem to eat anything. At the poplars, a Nuttall Sparrow (*Zonotrichia leucophrys nuttalli*) flew up and appeared to drink the overflowing sap, and later an Audubon Warbler

(Dendroica auduboni) did the same. Observations along these lines could not be continued because a heavy green fungus soon appeared and covered up both the exuding sap and the borings.

Theory of Workings.—As a matter of curiosity, I tasted sap which oozed from the bay, poplar and cedar trees. That from the bay tree gave the impression of sweetness, but left a very bitter after-taste. The sap from the cedar was flavored by the pitch, but was palatable. That from the poplars was extremely sweet, and suggested sugar water.

On all of the workings observed, the oldest holes were simple and at or near the tops of the trees, while the more recent holes were compound and nearer the tree base. In attempting to explain this, it is necessary to refer to the flow of sap in both deciduous and evergreen trees. At or just before the period of flowering or budding, the sap in a tree rises through the xylem from its place of winter storage in the roots, parenchyma and medullary rays. Soon after budding and flowering, this sap recedes down the phloem and is re-stored. An evergreen, such as a bay, would have to keep a fair amount of sap up the tree at all times to take care of the leaves; and a conifer, such as a cedar, would do likewise, even though anthesis in the conifer and flowering in the bay occurred at different times. I also noted that the great majority of holes were bored on the shady sides of the trees. This probably is due to the fact that the sap flows more freely there. Also sap would evaporate more readily from holes exposed to the sun. A natural dislike of light on the part of the bird itself may be a factor.

The foregoing considerations seem to explain the bird's choice of trees and the regions of the trunk upon which to work. Upon its arrival in late fall, the bird would, and did, attack the bay tree first, since this tree was flowering, and hence had the sap at a high level. The bird then would be expected to make the borings farther and farther down the trunk as the sap receded, and this it did. By this time (late in February), the poplars began to bud, implying the presence of sap, and the sapsucker turned its attentions to them, again working down the trunk as the sap receded. Holes made on the cedars were few in number, and evidently indicated that these trees were "second choice," although the bird was undoubtedly after the sap which was not subject to such abrupt rises and drops as in deciduous trees. Why or how the sapsucker can ascertain the presence of sap, I do not know, but it probably makes a great many errors in finding a tree which is in the process of flowering or budding. So it seems that this sapsucker, and one may infer, all sapsuckers of this subspecies, has one or more "stand-by" trees from which it can obtain sap at almost any time. Then, in the winter and spring, the bird works on trees in which the sap has risen, and moves the borings so as to follow the sap down, making compound holes to more readily facilitate gathering of the sap. I presume that the sapsucker does not work *up* with the rising sap, because this rise occurs mainly in the xylem, which is deeper within the tree and therefore more inaccessible than is the phloem.

This hypothesis is further borne out by records made of a Red-breasted Sapsucker observed working on a poplar (*Populus nigra*) on the Stanford University campus. This bird had been seen at irregular intervals from October 31, 1937, to February 2, 1938, working near the top of this forty foot tree. In previous years this, or a similar bird, worked extensively in winter on pepper trees (*Schinus molle*) at the same locality. This year it apparently did not touch them. Workings of the grouped type from past years are evident high on the trunk of the poplar, while this year's borings are fresher farther down the tree.

Echo Lake Individuals.—On September 12, 1937, four sapsuckers were observed working on a willow (*Salix* sp.) at Berkeley Camp, 7400 feet, El Dorado County, California, and these were observed for the following eleven days. All were in good plumage,

and judging by their actions, three were in a group, the fourth being an intruder. They were extremely quiet, and allowed me to approach to within six feet, and even on occasion to bring my hand to within six inches of them before they flew. When first seen, the four of them were clinging to neighboring branches of the twelve foot willow, and were so close to each other that all of them could have been enclosed in the space of a cubic foot. They apparently concentrated their work on this one willow, although a few simple holes were evident on a nearby white fir (*Abies concolor*). On the whole, the actions of these birds were similar to those of the sapsuckers previously described. Here, however, the work period was from four to five minutes. They frequently took drinks of the sap, and occasionally snapped at flies that came close. For all of the birds, the rest and work periods coincided as if by agreement, but during work periods there were evident individual differences in technique. The rest periods were from two to four minutes, during which time the birds continually blinked, often making enough noise to be heard a short distance away. The birds had about twenty-four distinct workings on this tree and frequently rotated between borings, as if by common consent. This to me, was one of the most surprising features of the entire study. Previously I had regarded the sapsucker as a solitary and non-gregarious bird, but here four of them were working and acting as a unit or community. Presumably they were immature birds, perhaps some of them from the same brood. Occasionally two birds drank from the same large working, but whenever the birds came too close (less than two inches) immediately there were sharp squeals and hasty retreats, although no actual conflicts. At times the birds raised their crests and chased each other from the more desirable workings, but there was no "peck order" evident during the many days of observation. The fourth bird, or intruder, could readily be told from the others because of its more pugnacious manner, restlessness, and frequent absences from the other three.

The workings of this group differed from the types found on the University of California campus, in that there were neither compound nor simple holes, but large areas and often complete bands on the stems which were laid bare to the wood (fig. 60 G, H). These bare regions were never longer than five inches, which is approximately the reach of the sapsucker, and they frequently had shreds of bark left adhering to them. I presume that the bark particles were left in order to provide a foothold for the birds, since in their work, the sapsuckers frequently slipped on the fresh glazed wood.

This "girdling" working lent itself to a rapid flow of sap, and there were hundreds of flies (house and stable) and two wood nymph butterflies continually near the copious supply of sweet-tasting sap. At one time I observed a sapsucker snap at and actually catch a fly which was about to land on the working; but the wood nymphs were undisturbed.

Unlike the holes on the University of California campus trees, which went only to the cambium layer, these girdling workings went through the cambium to the wood or xylem. Upon watching, it could be seen that the birds frequently ate tiny shreds of this cambium, but at no time did they seem to prefer it to the sap.

These birds bore out my surmise that the sapsucker works from the top down, following the descending sap. The older, smaller workings were at the tips of the stems, and the new, fresh ones were near the bases and at the junctions of the larger branches. When actually working, the birds would tilt their heads and probe under the bark at the top or bottom of the workings, presumably to drink the sap, start it flowing, or to eat the cambium. At this high altitude, the willow produces its leaves in early summer, and hence would have the sap still comparatively high in September, thus accounting for the birds' choice of a tree upon which to work at this time.

On September 22, I collected two of these birds for stomach analysis. Both were males. With the kind assistance of Dr. G. F. Ferris, of Stanford University, the stomach contents were analyzed, and, for bird number 1 were found to be: remains of an arachnid; a down feather; two wings of a winged ant; three legs and a head of a maculate carpenter ant (*Camponotus maculatus*). The entire stomach was filled with a yellowish cottony and opaque viscous liquid, probably the gastric fluids and the sap. The stomach contents of bird number 2 were: hundreds of heads and legs of the maculate carpenter ant surrounded by the same yellowish mass.

The occurrence of these ants was surprising, since they are not known to be great climbers, and therefore the sapsuckers must have obtained them from low branches or from the ground, possibly after the manner of a flicker.

SUMMARY

1. The Red-breasted Sapsucker, either by an innate sense, or by use of "test holes," can determine the presence of sap in a tree.

2. The upper portion of trees in which the sap has risen for flowering or budding is chosen for extensive feeding by the bird.

3. The bird follows the sap down the tree on the shady side, making borings which transect the transmitting phloem, and which collect the sap to the best advantage.

4. A cycle in the utilization of food trees is followed by the bird through its choice of trees which flower or bud in sequence.

5. When sources of abundant sap fail, the bird resorts to gymnosperms or evergreens in which there is a fairly constant, if meagre, supply of sap.

6. In late summer and autumn, insects and cambium augment the regular diet of sap.

7. There is a regular routine of action during working periods. The bird sometimes averages thirty or more new holes a day.

8. Community feeding has been noticed in the early fall, possibly due to a shortage of feeding areas or to a natural gregariousness on the part of immature birds.

Palo Alto, California, March 25, 1938.

FROM FIELD AND STUDY

Hailstorm Fatal to California Condors.—Two California Condors (*Gymnogyps californianus*) were found dead in Peachtree Canyon, which is about 20 miles northwest of Santa Barbara in the Santa Cruz drainage area, on October 17, 1936, by forest rangers in search of a reported lightning fire. Hailstones as large as walnuts still lay two feet deep in the gullies. They came upon a dead adult Condor lying near the carcass of a horse and, about a quarter of a mile away, a dead immature Condor. Another adult, probably the mate of the first bird, flew off laboriously when the party approached.

The two dead birds were brought to the Santa Barbara Museum of Natural History by the Forest Supervisor on October 22. Naturally, they were not in the best condition for mounting, but I managed to save the skins as well as the skeletal parts that were not used in preparing them. Measurements, photographs and notes were taken. Both birds were very fat, the adult female weighing 18¾ pounds and the immature male 22½ pounds. Each had a wing spread of 8 feet 2½ inches from tip to tip of the longest primaries. The head of the immature male was dusky and covered with down and made an interesting study skin (no. 3505, Santa Barbara Mus. Nat. Hist.). I mounted the adult for display in the office of the Forest Service in the Federal Building in Santa Barbara.

Upon examining the bodies, it was found that although the skins were unbroken, the bodies of both were badly bruised. The back and clavicles of each bird were fractured and there were blood clots under the skin and in the region of the heart. The crop and stomach of the adult were empty. A little material was in the crop of the immature bird and only a little hair from a previous feeding was in the stomach.

The circumstances surrounding the discovery of the birds and the condition of their bodies suggest that they had probably just begun to feed upon the the carcass of the horse when the hailstorm overtook them. In their attempt to reach cover, they were beaten down by the driving hailstones and killed when they struck the ground.

The condors involved in this tragedy were undoubtedly the ones which, since about 1927, I have known to nest in this region. There are estimated to be between 40 and 50 California Condors now in existence and they are distributed over a comparatively small area. Had the hailstorm covered this entire area, it is conceivable that the California Condor might have been practically exterminated. Drastic weather conditions may thus be a considerable factor in the extermination of depleted or localized species.—EGMONT Z. RETT, *Santa Barbara Museum of Natural History, California, March 8 1938.*

Correct Names for the Red-backed Sandpiper and Northern Long-billed Curlew.—In the first edition of the A. O. U. Check-list (1886, p. 152) our Red-backed Sandpiper appeared as *Tringa alpina pacifica* Coues with a range of "North America in general, breeding far north. Eastern Asia." This was repeated in the second edition, but in the *Auk* (vol. 21, 1904, p. 412) the Committee on Nomenclature adopted *"Pelidna alpina sakhalina* (Vieillot)" as an "earlier name." Under this name our bird has appeared in subsequent editions with a type locality of "en Russie=Sakhalin Island, Okhotsk Sea," and a range including North America and Eastern Asia.

This had seemed remarkable to me on account of the great difference in size, especially the bill, between birds from North America and those from Europe. Somewhat recently I secured a series of twenty-one (10 males, 11 females) collected by Mr. J. T. Wright at Hainan, Kingsu, and Liu-chi, Chekiang, China, in late October and December, 1927. Comparison of a similar series of eleven males and twelve females from North Carolina, Connecticut, Texas, Alaska, Oregon and California, taken in the months of March, April, May, June, September, October and December, and picked at random from my series of 175 skins from different parts of North America, shows that both sexes have bills averaging four millimeters longer than those of the Asiatic birds. This necessarily reinstates *P. a. pacifica* (Coues).

		Exposed culmen	Wing
pacifica	male	37.4 (36.0-39.3) mm.	118.4 (115.0-123.0) mm.
	female	41.4 (38.2-44.0)	121.9 (118.0-126.5)
sakhalina	male	33.0 (30.7-34.8)	117.7 (113.5-124.0)
	female	37.6 (34.5-40.0)	119.3 (114.3-125.0)

It will be noticed there is no overlapping in the length of the bills in the males, and very little in the females.

Dr. Oberholser, who kindly looked up the original description of *sakhalina* in the Nouveau Dictionnaire for me, writes that Vieillot gave no measurements, but meant apparently the common form of eastern Asia.

Most of the Chinese birds are juveniles, but all are in full winter plumage; and of the American birds eight are young, and three of the September birds are still in juvenal dress. The bill of this species grows very rapidly and attains its full length before October as a rule. Of Alaskan birds a downy juvenile collected on July 3 (no. 43886, L. B. B.) has a bill 13.4 mm. in length, a half-grown bird also taken on July 3 (no. 38789) one of 22.5 mm., and a young male (no. 27297) in full juvenal dress, taken on August 4, one of 34.3 mm.

In Red-backed Sandpipers the adults undergo a complete molt in September, whereas immatures in changing from juvenal to first winter plumage retain the juvenal tertiaries until late in the fall or winter. As a result, an October bird with fresh tertiaries is an adult, while one with fresh tertiaries in January is a juvenile.

The correct name of the small race of the Long-billed Curlew, admitted to the A. O. U. Check-list in the last edition under the name *Numenius americanus occidentalis* Woodhouse, is *N. a. parvus*.

Fortunately, Dr. Woodhouse in describing the small curlew he collected near Albuquerque, New Mexico, on August 20, 1851, gave its dimensions, showing it to be a bird with a very long wing and short bill. He measured the bill as 4.2 inches (106.7 mm.) and the wing as 11.5 inches (292.1 mm.). Thus his bird had a bill close to the mimimum for males of the northern race, 4.15 (105.4 mm.), and a wing longer than maximum for females of that race, 10.81 (274.6 mm.), but of normal size for the southern race, 11.26 (286.0 mm.). It is evident that such a combination is possible only in an immature female of the southern race in which the bill had not reached its full growth. Therefore *occidentalis* becomes a synonym of *americanus*, and for the small northern bird must be replaced by *parvus*. Of this fact I was aware when I described the Canadian subspecies.—Louis B. Bishop, *Pasadena, California, July 27, 1938.*

A Summer Record of the White-winged Crossbill in Oregon.—On July 12, 1938, while collecting in the Wallowa Mountains of northeastern Oregon, I came upon three White-winged Crossbills (*Loxia leucoptera*) in the spruces and firs of a sub-alpine meadow on the east fork of the Lostine River. The exact location was 18 miles south and 4 miles east of the town of Lostine, Wallowa County. Two males were taken, both of which were in breeding condition, with testes 7 mm. in length. These birds were singing a continuous and melodic song, much as described by Swarth (Univ. Calif. Publ. Zool., vol. 24, 1922, p. 234), who found this species breeding in July and August on the Stikine River, British Columbia. The songs I heard apparently were not of maximum volume.

There are no previous summer records of White-winged Crossbills for the state of Oregon, and in Washington, birds that have been noted in summer in the Cascade Mountains (Dawson, The Birds of Washington, vol. 1, 1909, p. 75), were not known to have been breeding.

Griscom's recent paper (Proc. Bost. Soc. Nat. Hist., vol. 41, 1937, pp. 77-210) on crossbills has emphasized the erratic ways of the Red Crossbill (*Loxia curvirostra*), especially with regard to nesting season and distribution. White-wings, he states (p. 201), are by temperament less vagrant, yet one may expect irregularity on the part of any crossbill. The present record affords another example of the southward invasion of the breeding range of *curvirostra* by *leucoptera*.—Alden H. Miller, *Museum of Vertebrate Zoology, Berkeley, California, August 1, 1938.*

A Northwest Race of the Cinnamon Hummingbird.—The Cinnamon Hummingbird (*Amazilia rutila*) has a large range which extends from southern Sinaloa on the west coast of Mexico south to Costa Rica. Throughout this area only one geographic variation has been recognized, namely, a very dark-colored race which occurs on the west coast of Chiapas, Guatemala, and western El Salvador, and which bears the name of *Amazilia rutila corallirostris* (Bourcier and Mulsant). Ridgway (Birds of North and Middle America, part 5, 1911, p. 417, footnote) has called attention to the pallor of specimens from northwestern Mexico and also to the fact that topotypes of *rutila* from Guerrero are really intermediate between the northwestern specimens and *corallirostris*. At the same time he combines all specimens from western Mexico in his comparative table of measurements. Why he did not name the pale northwestern population as a distinct race can only be conjectured, although the scarcity of northwestern material at his disposal may well have been the reason. In any case the extensive series of this hummingbird in the British Museum not only verifies Ridgway's comment, but emphasizes it, in that there are even greater differences between northwestern specimens and those from Guerrero than is shown in the series in the collections in the United States National Museum. There is, therefore, no reason why the pale extreme of northwestern Mexico should not be recognized by name. It may be known as

Amazilia rutila diluta, new subspecies

Type.—Adult male, no. 157163, Coll. U. S. Bureau of Biological Survey; Santiago, Nayarit, Mexico; June 21, 1897; collected by E. W. Nelson and E. A. Goldman.

Subspecific characters.—Similar to *Amazilia rutila rutila* (Delattre) of Guerrero north to Colima, but coloration below paler and more pinkish (less reddish) cinnamon, and upper parts slightly more golden (less greenish) bronze.

Range.—Northwestern Mexico in the states of Nayarit (San Blas; Santiago) and Sinaloa (Plomosas; Mazatlan).

Remarks.—Specimens of *rutila* have been examined from Guerrero (19), Oaxaca (2), and Colima (6). Specimens of *diluta* have been examined from Nayarit (5) and Sinaloa (5). Those from Colima are intermediate; the two from Colima in the Biological Survey collection are nearest *diluta*, whereas the four in the British Museum are typical of *rutila*.—A. J. VAN ROSSEM, *Dickey Collections, California Institute of Technology, Pasadena, California, August 1, 1938.*

Four Birds New to St. Lawrence Island, Alaska.—A surprising number of birds have been recorded from St. Lawrence Island, Alaska, including many New World as well as Old World species, and still the list apparently is not complete.

In the summer of 1937, Mrs. Murie had an opportunity to visit St. Lawrence Island and while she was there an Eskimo, Jimmie Otiyohok, brought to her five bird skins of species that he said were strange to the Eskimo. All these proved to be of interest. They were prepared by Otiyohok's wife, who has learned to prepare bird skins, and were neatly labeled. The birds were identified as follows:

Euphagus carolinus. Rusty Blackbird. A male taken at Gambell, St. Lawrence Island, by Jimmie Otiyohok. There are slight traces of rusty coloration in the plumage.

Hylocichla minima aliciae. Gray-cheeked Thrush. A female taken at Gambell, May 26, 1937.

Junco hyemalis hyemalis. Slate-colored Junco. Two males, both taken at Gambell, on May 21, 1937.

Prunella montanella. Mountain Accentor. A male taken at Camp Collier, St. Lawrence Island, on October 13, 1936.

These birds are all new to the avifauna of St. Lawrence Island, and the Mountain Accentor has been recorded for North America only once before. The previous record was based on a specimen taken by C. G. Harrold on Nunivak Island, Alaska, on October 3, 1927 (Swarth, Proc. Calif. Acad. Sci., ser. 4, vol. 17, 1928, p. 251). It is not surprising to find Siberian birds on St. Lawrence Island, which lies much closer to Siberia than to Alaska. It is possibly significant that four of the birds were taken in the spring and one in autumn, when migratory movements were taking place.

I am indebted to Dr. H. C. Oberholser and Dr. Herbert Friedmann, who compared the specimens with collections in the United States National Museum.—OLAUS J. MURIE, *Bureau of Biological Survey, Jackson, Wyoming, May 14, 1938.*

The Red Phalarope and Ruddy Turnstone in Colorado.—The Red Phalarope (*Phalaropus fulicarius*) and Ruddy Turnstone (*Arenaria interpres morinella*) are known only as stragglers in Colorado. Bergtold (A Guide to the Birds of Colorado, 1928, p. 85) states that there are two records of the former. The first of these is a female (no. 5152, Colo. Mus. Nat. Hist.) taken at Loveland, Larimer County, July 25, 1895, by E. A. Preble (Cooke, Auk, vol. 26, 1909, pp. 409-410), but we have been unable to learn particulars of the other occurrence. In addition to the above, we have a recent sight record, a female in high plumage which we saw at Nee Grande Reservoir, in Kiowa County, on June 27, 1938. It was in company with a mixed flock of Least and White-rumped sandpipers and a single adult male Ruddy Turnstone. The latter (no. 18895, Colo. Mus. Nat. Hist.) was secured by our companion, Robert B. Rockwell. There are comparatively few occurrences of turnstones in Colorado. Sclater (A History of the Birds of Colorado, 1912, p. 137) gives three records. One female, mentioned by Sclater, taken May 13, 1900, on Berkeley Lake, in Denver, is in the Museum collection (no. 14294); in addition, we should like to list a specimen, taken on the same lake, May 3, 1906, which is in the Colorado University collection (no. 973) in Boulder, Colorado.—ALFRED M. BAILEY and ROBERT J. NIEDRACH, *The Colorado Museum of Natural History, Denver, Colorado, July 22, 1938.*

A Race of the Green Kingfisher from Northwestern Mexico.—During his recent work in the British Museum the senior writer took advantage of the opportunity to study the representative series of the Green Kingfisher (*Chloroceryle americana*). The result confirmed the belief that we have for some time entertained, namely, that Sharpe's *Chloroceryle americana septentrionalis* is a composite of two races. A description of the new race with consequent territorial restriction of *septentrionalis* is given in the following diagnosis and comment.

Chloroceryle americana leucosticta, new subspecies

Type.—Adult female, no. 31895 Dickey collection; Rancho La Arizona, near Saric, extreme northern Sonora, Mexico; May 8, 1937; collected by A. J. van Rossem and Robert Hannum.

Subspecific characters.—Similar to *Chloroceryle americana septentrionalis* Sharpe of eastern and and southern Mexico and northern Central America but white markings everywhere (both exposed and concealed) much more extensive, the forehead more extensively streaked with white and wings with all coverts normally conspicuously spotted with white; dorsal plumage more yellowish or brassy green (less bluish).

Range.—Northwestern Mexico from Nayarit north through Sinaloa, Sonora, and Chihuahua; east to northern Coahuila and west central Texas.

Remarks.—Sharpe's description (Cat. Birds Brit. Mus., vol. 17, 1892, p. 134) indicates the southern race, even though the name was applied to the entire series then present in the British Museum. However, the subsequently selected type is from Teapa, Tabasco, and there seems every reason to suppose that the description was drawn from that specimen. We designate that locality, therefore, as a properly restricted type locality, although Goldman (Smith. Misc. Coll., vol. 56, 1911, p. 1) has in effect already done so.

The characters of *leucosticta* are best expressed in northwestern Mexico. The beautifully prepared series of 64 specimens from Sonora and Chihuahua in the collection of the Museum of Comparative Zoology was examined some years ago and named in manuscript. Publication has been delayed, however, pending a re-examination of the British Museum and United States National Museum collections. Texas specimens from "western Texas" (2), Devil's River (2), Fort Clark (5), Nueces (1), and Ingram, Kerr County (1) are individually variable but certainly average much closer to *leucosticta*.

There appears to be little variation in *septentrionalis* in eastern Mexico from Tamaulipas, Nuevo Leon, Vera Cruz, Tabasco, south through Oaxaca, Chiapas, and northern Central America, and west to Guerrero and Colima, except that specimens from the west coast from Tehuantepec northward approach, in slight degree, the characters of *leucosticta*. The single specimen examined from Brownsville, Texas (no. 285854, Biol. Surv. Coll.) is indistinguishable from *septentrionalis*.—A. J. VAN ROSSEM and THE MARQUESS HACHISUKA, *Dickey Collections, California Institute of Technology, Pasadena, California, August 2, 1938.*

NOTES AND NEWS

The International Ornithological Congress that met this year in Rouen, France, accepted the invitation of the American Ornithologists' Union to hold the next meeting in the United States. This will be the first time that the Congress has convened in the New World. Appropriately, Dr. Alexander Wetmore was elected president. We may look forward with great pleasure, then, to 1942 when the Tenth International Congress will bring many visiting ornithologists to this country. The exact place and time of meeting are not yet determined.—A.H.M.

"The Bird Life of Louisiana" by Harry C. Oberholser was received by us on August 13 of this year. It was published by the State of Louisiana Department of Conservation, as Bulletin No. 28 of that department, in cooperation with the Biological Survey, United States Department of Agriculture. This is the first comprehensive treatment of the birds of Louisiana and it takes a place of distinction among the increasing array of "state" bird books. The work comprises xii+834 pages, and 45 plates, eight of which are in color, engraved from paintings by Brooks, Sawyer, Horsfall and Sutton; it is well printed, except for the inking of the illustrations. There are short introductory sections on bird migration and protection, but the volume is given over chiefly to the accounts of species. These include information on habitat, distinguishing features and habits, and especially detailed records of occurrence within the state which appear to have been compiled with great care. Dr. Oberholser, ever active in nomenclatural matters, has adopted many scientific names not currently used. As always, the trend is toward greatly subdivided genera. Thus, the book becomes important to the nomenclaturalist who may have no concern with the geographic region treated by it. Convenient references to the A. O. U. Check-list are supplied where unfamiliar names are used, and in many, but unfortunately not all, such instances reasons for the adoption of names are given.—A.H.M.

"The Log of Tanager Hill" (Williams and Wilkins Company, Baltimore, 1938; 244 pp.) by Marie Andrews Commons is an unpretentious diary of eight years of bird banding at Lake Minnetonka, Minnesota. It is pleasantly written, though not provided with a central theme that would stimulate consecutive reading. It fills well the need for a book to recommend to prospective and beginning banders, pointing the way to the enjoyment and knowledge to be gained from operating a banding station. It also affords a good example of care and exactness in the keeping of banding records.—A.H.M.

Under pressure from certain sportsmen who have requested more liberal waterfowl hunting regulations, the United States Biological Survey has this year relaxed the provisions for protecting the duck populations. The hunting season has been extended from 30 to 45 days and the possession limit, which as far as the ducks are concerned amounts to the bag limit, has been raised from 10 to 20. Justification for this is sought in the greater numbers of waterfowl since 1934. It has been estimated that in the four years the increase has amounted to 25 per cent. The season and the possession limits are now increased 50 to 100 per cent, respectively, in a single year. Just at a glance the books do not seem to balance; the ducks are in the red. To be sure, these items can not be added up like dollars and cents. But, with this liberalization, it is probable that numbers will drop again to the 1934 level. The new provision permitting the taking of limited numbers of canvasbacks, redheads, buffleheads and ruddy ducks, heretofore fully protected, may have some merit. It will avoid some wastage of these species that inevitably are shot by mistake. It may do them no harm; it can not do them any good. In future years we may expect still more pressure to extend the season and to restore baiting. To this there must be no yielding.—A.H.M.

MINUTES OF COOPER CLUB MEETINGS

NORTHERN DIVISION

MAY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, May 26, 1938, at 8:00 p.m., in Room 2503 Life Sciences Building, Berkeley, with President Emlen in the chair and about ninety members and guests present. Minutes of the Northern Division for April were read and approved. Names proposed for membership were: William F. Barr, 1606 53rd Avenue, Oakland, by Alden H. Miller, and Miss Annie R. Richardson, 162 Melville Avenue, Palo Alto, California, by Wilbur V. Henry.

President Emlen called attention to the meetings of the Western Society of Naturalists and the American Ecological Society, in connection with the meeting of the American Association for the

Advancement of Science, at San Diego, June 20 to 25. He also announced that the American Society of Mammalogists would meet in Berkeley, July 19 to 23. Mr. Alden H. Miller reviewed a recent publication of the Field Museum of Natural History, The Birds of El Salvador, by Dickey and van Rossem.

Lieutenant Commander Reuben H. Hunt, of the U. S. Navy Medical Corps, gave a delightful account of the birds of Midway Island, illustrating his talk with lantern slides. He contrasted present development of the island as a base for Pan American Airways with conditions in the "good old days," when the Commercial Pacific Cable Company first established there, and the trip to San Francisco in the auxilliary schooner "Florence Ward" might take as long as thirty days. One of the most popular birds of the island is the Laysan Albatross or "Gooney," which nests there in large numbers and is exceedingly tame. Progressive steps in the elaborate "Gooney dance," which takes place all during the nesting season, were shown in a series of pictures taken at close range. The Black-footed Albatross or "Black Gooney" has a dance which is quite similar but set at a slower tempo, so that attempts at dancing between members of the two species are unsuccessful. Nesting Sooty Terns number in the tens of thousands. The graceful White or Fairy Tern lays its egg upon the bare limb of a tree. Commander Hunt expressed some concern over the future welfare of these many nesting birds on account of man's activities at the island.

At the close of the meeting, Mr. and Mrs. Milton Ray exhibited ten beautiful photographs of British birds, the work of Mr. Oliver G. Pike, which they had obtained on a recent trip to England.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

JUNE.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, June 23, 1938, at 8:00 p.m., in Room 2503 Life Sciences Building, Berkeley, with the Vice-President, E. L. Sumner, Jr., in the chair and thirty-five members and guests present. Minutes of the Northern Division for May were read. Minutes of the Southern Division were read in part. An application for membership was received from Asa L. Brown, Janesville, California, endorsed by Eric C. Kinsey.

Mrs. Grinnell read a field report from Mr. Merrick F. Hersey, telling of the experiments of Mr. Odel Johnson upon a nesting pair of Black Phoebes at Crockett, California. Four successive clutches of eggs were taken from these birds, after which they reared four young in a new nest. A letter from Miss Grace Nicholes described the nesting of Wood Ducks near Healdsburg. Last year they had reared five young and this year were again successful. Mrs. Mead recounted some activities of Western Grebes and their chicks, seen on Clear Lake May 28. One chick had remained clinging to the back of its parent during a complete dive. At Chester, near Lake Almanor, June 11, Mrs. Mead saw 10 pairs of Canada Geese on a gravel bar, each accompanied by 4 or 5 goslings. At Eagle Lake, Mr. Kinsey had noticed nesting Pigmy Nuthatches, Western Bluebirds and Mountain Bluebirds inhabiting the same stump, apparently without rivalry.

The principal speaker of the evening, Mr. George T. Oberlander, presented a paper entitled "History of Acquaintance with Three Black Phoebes." Observations carried on regularly since August 1937 gave a detailed picture of the movements, definition of territory, feeding habits and nesting of these birds, in an area including much of the University campus and Strawberry Canyon. Dr. T. S. Palmer contributed information about Black Phoebes in the same area fifty years ago, when the Palmer home occupied the present site of the west wall of the stadium.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

JULY.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, July 28, 1938, at 8:00 p.m., in Room 2503 Life Sciences Building, Berkeley, with President Emlen in the chair and sixty-five members and guests present. Minutes of the Northern Division for June were read and approved. Minutes of the Southern Division were read by title.

The president outlined the main points in a paper entitled "The Truth about Mosquito Control," by W. S. Corkran, written in answer to charges contained in William Vogt's paper "Thirst on the Land," which was reviewed before the November 1937 meeting of the Club. Reports of field observations included discussion of shorebird migration by several members.

Motion pictures of the animal life of the Aleutian Islands were shown by Mr. Olaus J. Murie, photographer of the 1936 and 1937 expeditions of the Biological Survey to the islands. Most of the islands in this chain, extending 1200 miles beyond southwestern Alaska, have been set aside by the Biological Survey as the "Aleutian Island Bird Reservation." Blue foxes, raised for their fur, live practically in a wild state on many of the islands. One recommendation of the expeditions was that certain islands be reserved for the exclusive use of colonies of the rarer birds, such as the Whiskered Auklet and the Fulmar. Among the birds found in various parts of the archipelago were the Emperor Goose, several species of petrel, albatrosses, Pacific Kittiwakes, Tufted Puffins and murres.

Sea Lions play an important part in the economy of the island natives, who are decreasing rapidly but may be found living in small villages of from 45 to 90 inhabitants.

The sea otter, whose recent trend toward increase in numbers after threatened extinction has aroused such interest, is found on some of the smaller islands. Pictures of the otters on the reefs and kelp beds which are their habitat were especially interesting. The tremendous enjoyment afforded the expeditions by the wealth of bird life emphasized the future need of careful accounting of such precious areas. (After the meeting, Dr. T. S. Palmer recalled that it was B. W. Evermann, a former president of the Cooper Club, who first suggested the establishment of the Aleutian Islands as a bird reserve, some thirty years ago.)

Present in the audience were Dr. Harry R. Painton and Mr. Fred A. Schneider, two of the four founders of the Cooper Club.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

SOUTHERN DIVISION

MAY.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held at the Los Angeles Museum, Exposition Park, on Tuesday, May 31, 1938, at 8 p.m., with about fifty members and guests present. In the absence of the president, Vice-President Peyton presided.

The minutes of the Southern Division for March were read and approved. The minutes of the Northern Division for March and April were read by title.

Four applications for membership were read: Mrs. Irene Sebastian, 6838 Sunset Blvd., Hollywood, Calif., proposed by Stuart O'Melveny; James G. Suthard, 832 Ohio Ave., Long Beach, Calif., by W. Lee Chambers; Harrison Brown, Hornby Island, B. C., Canada, by Bill Webb; Wm. Johnson Howard, 904 Grace Securities Bldg., Richmond, Va., by J. McB. Robertson.

Mr. J. McB. Robertson announced that Ralph Hoffmann's "Birds of the Pacific States" has been reissued at the new price of $3.50.

Reports on recent observations by members included the following. Mr. Appleton saw a Yellow-billed Magpie on Ventura Blvd. near Laurel Canyon Road. Mr. Willett found a female Western Tanager feeding a young one in his backyard in the southwest residential district of Los Angeles. The young bird was able to fly. Mr. Platford observed gulls eating young Pintail Ducks near Santa Barbara. Mr. Reis reported Yellow Rails nesting at Long Valley, California. Mr. Sidney Peyton found ten fresh eggs of the Anthony Green Heron in a river bottom near Fillmore. Hildegarde Howard reported a pair of Killdeer trying to raise four young on the gravel roof of the Los Angeles Museum.

Speaking on the subject "Some Birds of the West Coast of Mexico and Off-shore Islands," Mr. George Willett presented a review of his trip in the company of four other Cooper Club members on Mr. Pemberton's yacht. At the four points touched along the coast of Lower California the birds, with the exception of the White Ibis and Brewster Booby, were merely subspecifically distinct from those of California. Crossing the Gulf of California to Isabel Island and the Tres Marias the birds became more interesting. Brewster and the Blue-footed boobies, the Red-billed Tropic Bird and the Man-o'-war-bird were abundant at Isabel Island. Strangely enough, though this island is covered with vegetation, no land birds were seen. The densely timbered Magdalena Island of the Tres Marias group has a large avifauna related to the adjacent Mexican coast, including Yellow-headed Parrot, Copper-tailed Trogan, and Blue Mockingbird.

Continuing southward the party touched at seven points on the west coast of Mexico, finding tropical conditions from Navidad Bay to Acapulco and again at the farthest point south in the trip, Huatulco (latitude 15°). At Huatulco, trogons and Pileated Woodpeckers were plentiful. The return trip north was made by way of the outlying islands, collecting birds at San Benedicto, Socorro, Clarion, the San Benitos and Guadalupe. Regarding the closely associated islands of San Benedicto, Socorro and Clarion, it was pointed out that each of these islands has a different genus of wren. These are generically related to mainland birds but not to each other and indicate the accidental derivation of the island species.

From Guadalupe Island the party headed back to the mainland at San Martín, thence to the Coronados and to San Pedro. The trip lasted approximately three months, from January 19 to April 15.

Mr. Willett had four trays of bird skins laid out for study by the members.

Adjourned.—HILDEGARDE HOWARD, *Secretary.*

JUNE.—Approximately three hundred members and guests assembled at the Los Angeles Museum on Tuesday, June 28, 1938, for the regular monthly meeting of the Southern Division of the Cooper Ornithological Club. The meeting was called to order by President McCoy at 7:35 p.m.

By motion from the floor the reading of the minutes of the previous meeting was dispensed with. One application for membership was read: George Levant Thompson, 2047 Stillman Street, Selma, Calif., proposed by W. T. Shaw.

There being no further business to come before the club, the president called upon Mr. J. R.

Pemberton to proceed with the scheduled program of the evening which consisted of motion pictures taken by Mr. Pemberton and Mr. Ed. N. Harrison, on the Pemberton Mexican trip of 1938.

The pictures followed the itinerary of the trip, with views of the islands and ports visited. Of particular interest to ornithologists were the many color photos of birds. Chief among these were the excellent views of the Blue-faced, Red-footed and Brewster boobies, both adults in full breeding plumage, and fledglings in the nest, and of two species of Man-o'-war-bird (*Fregata magnificens* and *Fregata minor*), clearly showing the brown shoulders of the male of *minor* which distinguish it from *magnificens*. The males of both species were shown exhibiting the bright red pouch.

Other birds pictured in color were the Red-billed Tropic Bird, Military Macaw, the Turkey and Black vultures (with downy young of the latter), Caracara, and Brown Pelican. Action scenes of birds included pelicans diving from the air into the water to capture their food, thousands of cormorants in flight at Magdalena Bay, boobies in their peculiar "military drill," and a Black-footed Albatross following the ship.

Of general interest were views of Manta rays, sharks, and several other large fish; sea elephants were photographed at San Benito Island. Two sea lions with the sea elephants afforded the opportunity for comparison of the two types. The former, with strong, relatively large flippers, appeared surprisingly graceful and agile in contrast with the heavy, more cumbersome sea elephant, with its very small, weak front limbs.

Interspersed throughout the six reels of film were various scenes of life on the ship and of the activities engaged in, such as dredging, fishing, skinning birds and mammals, drying skeletons, etc. As five Cooper Club members were in the party, these intimate views were particularly entertaining. In all, the pictures represent a well-rounded record of the expedition.

At the conclusion of the program, the president made a brief announcement to the visitors regarding membership in the club.

Adjourned.—HILDEGARDE HOWARD, *Secretary*.

JULY.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held at the Los Angeles Museum, Exposition Park on Tuesday, July 26, 1938, at 8 p.m. Eighteen members and two guests were present, with Mr. McCoy presiding.

The minutes of the Southern Division for June were read and a correction made changing "at San Benito Island" to read "on the eastern island of the San Benito group." Six applications for membership were read, as follows: Frank Fairfax Lockwood, Palos Verdes Estates, Calif., Clarence J, Parker, 821 North Garfield Ave., Alhambra, Calif., and Russell K. Grater, P. O. Box 395, Boulder City, Nevada, all proposed by W. Lee Chambers; Mrs. Myrtle Thompson, 260 Orange St., San Bernardino, Calif., and Mrs. Elizabeth Bradley, 527 Mountain View Ave., San Bernardino, Calif., proposed by Wilson C. Hanna; and George Hines Lowery, Jr., Box 316, Louisiana State University, Louisiana, by George Willett.

There being no scheduled program for the evening, the president called for comments and observations from the members. Dr. Archibald Bell called attention to two publications of interest to Cooper Club members: one the book by Donald Culross Peattie, "The Prairie Grove," which deals with the early natural history of Illinois, the other, Dr. Frank Lillie's address before the Ottawa meeting of the American Association for the Advancement of Science, published in *Science* for July 22, 1938, in which the future of zoological sciences is discussed. Dr. Bell voiced his own opinion that the conservation program is an important phase of the future of ornithology.

Miss Fossler suggested the advisability of the Cooper Club taking a more active part in conservation matters. Mr. John McB. Robertson explained that the Cooper Club was organized for educational purposes, with greatest stress on scientific publication, and not as a conservation society. He pointed out that the Audubon Society is the organization which is particularly concerned with conservation.

Sid Platford reported upon the new 1938 waterfowl regulations which he fears will be detrimental to the birds. He also reported the observation of a substantial breeding colony of Least Terns near Del Rey.

Mr. Willett gave a report of the meeting of the American Society of Mammalogists in Berkeley, July 19 to 23, 1938.

Mr. Ed Harrison reported seeing large numbers of Wood Ibis in various parts of San Diego County recently. Mr. Couch had observed that the Phainopeplas were not nesting this year east of the mountains in the region of San Diego, though they have appeared as usual on the coastal slopes to breed.

Dr. Bell gave a brief report on the natural history activities of the Los Angeles Junior College, indicating that the college now has 500 bird skins and about 300 mammal skins. Students are taken on short trips to observe different forms of animal life. An interesting note from one of his trips was the occurrence of Clark Crows in flocks of 50 to 100 on Mt. Pinos.

Mr. McCoy announced the tentative programs for the remainder of the year, and Mr. Harrison indicated that he could have some more moving pictures for the Club soon.

Adjourned.—HILDEGARDE HOWARD, *Secretary*.

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